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**EP-A- 0 269 401**
**DE-U- 8 520 621**
**GB-A- 2 115 702**
**GB-A- 2 171 915**

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## Description

The present invention relates to an absorbent article, especially a garment for absorbing body fluids and exudates, such as urine. More particularly, the present invention relates to absorbent garments, such as disposable diapers and adult incontinence garments, which are configured to absorb body exudates while also helping to provide reduce skin hydration.

Breathable polymer films have been employed as outer covers for absorbent garments, such as disposable diapers. The breathable films are typically constructed with micropores to provide desired levels of liquid impermeability and vapor permeability. Other disposable diaper designs have been arranged to provide some level of breathability at the leg cuff regions of the diaper. For example, see U.S. patent 4,636,207 issued January 13, 1987 to K. Buell.

Diapers and plastic pant overgarments for covering diapers have employed perforated regions to help ventilate the garment. For example, see U.S. Patent 3,081,772 issued March 19, 1963 to H. Brooks et al. and U.S. Patent 2,544,069 issued March 6, 1951 to H. Cutler.

Document EP-A-0 269 401 discloses an absorbent garment having absorptive means and two air pervious flaps. The absorptive means comprise a liquid permeable layer, a liquid impermeable layer, and an absorbent layer disposed therebetween, the absorptive means. The garment ventilates the absorbent layer by circulation of air about and around the air pervious flaps. The flaps are joined to the absorptive means and thus serve to draw moisture from within the garment and evaporate the moisture from around a waist band region of the garment. The flaps also form an outside surface of the garment and thus bring same into contact with the wearer's outer garments. Thus, the potential for soiling the outer garments exists. Additionally, the action of gravity may draw moisture toward the ventilating region (as with a sleeping child in a recumbent position) and thus soak through the outer garments.

Document GB-A-2 171 915 discusses a pantiliner having ventilation areas that allow the passage of vapor to provide cooling and drying effects; and Document GB-A-2 115 702 discusses an absorbent article having a porous, vapor-permeable, liquid impermeable backing sheet.

U.S. Patent 4,341,216 issued July 27, 1982 to M. Obenour describes a disposable diaper provided with a two-element breathable backsheet. The two elements are a vapor pervious, relatively liquid impervious outer sheet, and a liquid impervious inner panel.

Other disposable garment designs have employed additional layers of material under the bodyside liner. For example, European Patent Application EP 0 165 807 A1 of T. Osborn III published 27 December 1985 describes a sanitary napkin which includes an apertured topsheet and a resilient, reservoir layer underlying the topsheet. The absorbent structure can also include a wicking layer between the apertured topsheet and the resilient layer, an absorbent core underlying the resilient layer, and a moisture barrier located against the outermost side of the absorbent core.

Various types of diaper structures have employed hydrophilic wicking layers to conduct fluid within an absorbent structure. For example, see U.S. Patent 4,388,371 issued July 6, 1982 to F. Dawn et al.; U.S. Patent 4,259,958 issued April 7, 1981 to R. Goodbar; and UK Patent Application GB 2 170 108 A of L. Bowman et al. published 30 July 1986.

Still other diaper configurations have employed embossed layers configured to provide raised regions that separate the user from the absorbent pad. For example, see U.S. Patent 4,324,247 issued April 13, 1986 to M. Aziz; U.S. Patent 4,041,951 issued August 16, 1977 to L. Sanford; U.S. Patent 3,945,386 issued March 23, 1976 to E. Anczurowski et al.; and U.S. Patent 4,413,032 issued November 1, 1983 to L. Hartmann et al.

Disposable absorbent articles have also employed an isolating layer between a topsheet layer and an absorbent layer. For example, GB 2 193 625 A of M. Suzuki et al. published 17 February 1988 includes an isolating layer composed of polyester fibers and having a selected compressive elastic recovery rate under wet conditions. U.S. Patent 4,480,000 issued October 30, 1984 to I. Watanabe et al. describes an absorbent article which includes a web comprised of polyester fiber which is placed on top of an absorbent core layer. The absorbent article is described as being able to absorb fluid at an enhanced rate and to have a feeling of dryness even after such absorption.

U.S. Patent 3,987,792 issued October 26, 1976 to J. Hernandez et al. describes a disposable diaper comprising a water-pervious layer, a spongy, resilient and compressible hydrophobic fibrous layer, an absorbent core, and a water-impervious layer. The hydrophobic fibrous layer is pervious to fluids in the uncompressed condition, but is impervious to fluids when compressed. The description indicates that when compressed, the hydrophobic fibers intermesh to form a seal or barrier.

Conventional absorbent articles, such as those described above, have not been completely satisfactory. For example, articles which employ a microporous outercover can exhibit a cold and clammy feeling when the garment is wetted and moisture is evaporating through the microporous film. The articles which employ perforated films can exhibit excessive leakage of liquids from the article, and can excessively soil the wearer's outergarments. In addition, when the absorbent material of the article becomes loaded with liquid, the wet absorbent can block the escape of moisture from the wearer's skin. Other absorbent garment designs which include additional layers between the bodyside liner layer and the absorbent core layer have not been able to sufficiently reduce the hydration of the wearer's skin. As a result, the wearer's skin has remained susceptible to abrasion and irritation.

The present invention provides an absorbent article according to independent claim 1. Further advantageous features of the article are evident from the dependent claims, the description, figures and examples. The claims are intended to be a first non-limiting attempt at describing the invention in general terms. The invention provides a disposable diaper having a humidity transfer region, breathable zone panel and separation layer.

The present invention provides a distinctive absorbent article which generally delimits a front waistband section, a rear waistband section and an intermediate section which interconnects the front and rear waistband sections. The article comprises a substantially fluid impermeable backsheet layer, a liquid permeable topsheet layer positioned in facing relation with the backsheet layer, and an absorbent body located between the backsheet layer and topsheet layer. The absorbent body includes a humidity transfer region which is configured to exhibit relatively low moisture retention. A vapor permeable panel is connected to the backsheet layer in at least one waistband section of the article and is arranged in an overlying registry with at least a portion of the humidity transfer region of the absorbent body.

In another aspect of the present invention, the absorbent article generally delimits a front waistband section, a rear waistband section and an intermediate section which interconnects the front and rear waistband sections. The article comprises a substantially fluid impermeable backsheet layer, a liquid permeable topsheet layer positioned in facing relation with the backsheet layer, and an absorbent body located between the backsheet layer and topsheet layer. Spacing means, such as one or more liquid permeable separation layers, are located between the topsheet layer and the absorbent body, and are configured to readily allow fluid transfer between the topsheet layer and the absorbent body. The separation layers are composed of a substantially hydrophobic material and have a total bulk caliper of at least about 0.04 cm (measured at a pressure of 0.0207 kPa). A vapor permeable panel is connected to the backsheet layer at a waistband section of the article, and is arranged in an overlying registry with at least a portion of the absorbent body.

The absorbent article of the invention can advantageously provide improved separation between the wearer's skin and the absorbent body. In addition, the absorbent article can provide a more effective dissipation of water vapor away from the wearer's skin and out from the interior of the absorbent article. As a result, the article of the invention can advantageously provide reduced wetness of the wearer's skin (lower skin hydration), and reduced susceptibility to skin abrasion and irritation. The occlusive, humidifying effects of the wet absorbent body can be reduced more effectively, and greater comfort can be provided for the wearer. In addition, the distinctive configuration of the invention can advantageously reduce the cool damp feeling at the outer surface of the article, which can typically occur with the use of backsheet layers composed of breathable films.

The invention will be more fully understood and further advantages will become apparent when reference is made to the following detailed description of the invention and the accompanying drawings, in which:

Fig. 1 representatively shows a partially cut away, top plan view of an absorbent article of the invention;

Fig. 2 representatively shows an exploded view of an absorbent article of the invention;

Fig. 3 representatively shows a partially cut away, top plan view of an absorbent article which includes a humidity transfer region;

Fig. 4 shows a schematic, partially sectioned representation of an apparatus for measuring Test Relative Humidity values;

Fig. 5, 5A and 5B representatively show an apparatus for determining a Moisture Retention Index;

Fig. 6 representatively shows an apparatus for determining a Wicking Index;

Fig. 7 representatively shows a partially sectioned view of disposable diaper having an absorbent composite with a humidity transfer region;

Fig. 8 representatively shows a partially sectioned view of an embodiment of an absorbent body where the humidity transfer region is in the shape of a circle;

Fig. 9 representatively shows a partially sectioned view of another embodiment of an absorbent body having a humidity transfer region composed of a multi-layer composite;

Fig. 10 representatively shows a partially sectioned view of an embodiment of an absorbent body wherein the humidity transfer region is in the shap of a notch; and

Fig. 11 is a graph which representatively shows water vapor transmission rate as a function of the amount of liquid loaded into an absorbent body.

The following detailed description will be made in the context of a disposable diaper article. It is readily apparent, however, that the absorbent structure of the present invention would also be suitable for other absorbent articles, such as feminine care pads, incontinence garments, and the like.

With reference to Figs. 1 and 3, an integral absorbent garment article, such as disposable diaper 10, generally delimits a front waistband section 12, a rear waistband section 14, and an intermediate section 16 which interconnects the front and rear waistband sections. The front and rear waistband sections include the general portions of the article which are constructed to extend substantially over the wearer's front and rear abdominal regions, respectively, during use. The intermediate section of the article includes the general portion of the article which is constructed to extend through the wearer's crotch region between the legs. The absorbent article further comprises a substantially fluid impermeable backsheet layer 20, a liquid permeable topsheet layer 30 positioned in facing relation with backsheet layer 20, and an absorbent body 40, such as an absorbent pad, is located between the backsheet layer and topsheet layer. Absorbent body 40 includes a humidity transfer region 44 (Fig. 3) which is configured to exhibit a relatively low moisture retention. A vapor permeable panel, such as breathable panel 70, is substantially liquid impermeable and is operably connected to backsheet layer 20 to extend partially or completely over at least one waistband section of diaper 10. The breathable panel may be an integral portion of the backsheet, or may be a separate component which is assembled to the backsheet. Breathable panel 70 is, for example, composed of a material having a water vapor transmission rate (WVTR) value of at least about 2000 g/m$^2$/24 hour. In the illustrated embodiment, at least a part of the breathable panel is positioned in a generally adjacent, overlying facing registry with respect to humidity transfer region 44 of absorbent body 40.

In a particular embodiment of the invention, spacing means, such as one or more liquid permeable separation layers 50, may be located between topsheet layer 30 and absorbent body 40 with the separation layers constructed to readily allow fluid transfer between the topsheet layer and absorbent body. Separation layers 50 can be composed of a substantially hydrophobic material and have a total bulk caliper of least about 0.04 cm (measured at a pressure of 0.207 kPa).

Marginal portions of diaper 10, such as marginal sections of backsheet 20, may extend past the terminal edges of absorbent body 40. In the illustrated embodiment, for example, backsheet 20 extends outwardly beyond the terminal marginal edges of absorbent body 40 to form side margins 26 and 28 and end margins 22 and 24 of the garment. Topsheet 30 is generally coextensive with backsheet 20, but may optionally cover an area which is larger or smaller than the area of backsheet 20, as desired.

Diaper 10 may be of various suitable shapes. For example, the diaper may have an overall rectangular shape, T-shape or an approximately hour-glass shape. In the shown embodiment, diaper 10 has a generally I-shape.

The various components of diaper 10 are integrally assembled together employing various types of suitable attachment means, such as adhesive, sonic bonds, thermal bonds or combinations thereof. In the shown embodiment, for example, topsheet 30 and backsheet 20 are assembled to each other and to absorbent body 40 with lines of adhesive, such as a hot melt, pressure-sensitive adhesive. Similarly, other diaper components, such as elastic members 60, 64 and 66 and fastening members 36, may be assembled into the diaper article by employing the above-identified attachment mechanisms.

The illustrated embodiment of diaper 10 includes ear portions 48, which extend laterally along the diaper cross-direction 90 and are positioned at least at the rear waistband section 14 of diaper 10. Ear portions 48 may also be located at front waistband section 12 of the diaper. The ear portions may be integral with backsheet layer 20, or may comprise separate sections, which are composed of the same or different material than backsheet 20 and are suitably assembled and attached to the backsheet layer. Ear sections 48 typically provide extensions of the diaper waistband suitable for completely encircling the waist of the wearer during use.

Fastening means, such as adhesive tapes 36, are employed to secure the diaper on a wearer. Alternatively, other fastening means, such as buttons, pins, snaps, hook-and-loop fasteners, mushroom-and-loop fasteners, or the like, may be employed.

To provide improved fit and to help reduce leakage of body exudates from diaper 10, the diaper side margins and end margins may be elasticized with suitable elastic members, such as single or multiple strands of elastic. The elastic strands may be composed of natural or synthetic rubber, and may optionally be heat-shrinkable or heat-elasticizable. Elastic members 60 are constructed to operably gather and shirr side margins 26 and 28 to provide elasticized leg bands which can closely fit around the legs of the wearer to reduce leakage and provide improved comfort and appearance. Similarly, waist elastic members 64 and 66 can be employed to elasticize diaper end margins 22 and 24 to provid elasticized waistbands. The waist elastics are configured to operably gather and shirr the waistband sections to provide a resilient, comfortably close fit around the waist of the wearer. In the Figures, the elastic members are illustrated in their uncontracted, stretched condition for the purpose of clarity.

Backsheet 20 is composed of a substantially fluid impermeable material, which is substantially impermeable to both liquid and gas. In particular, the backsheet is substantially impermeable to at least water and water vapor. An example of a suitable backsheet material is a polymer film composed of polyethylene, polypropylene, or the like. Typically, the polymer film has a thickness within the range of about 0.0018-0.0051 cm (0.0007-0.002 inch). Backsheet 20 may alternatively be composed of a nonwoven fibrous web constructed to provide the required level of fluid impermeability. For example, a nonwoven web composed of spunbonded or meltblown polymer fibers may be selectively treated with a water repellent coating, or laminated with a fluid impermeable, polymer film. In a particular embodiment of the invention, backsheet 20 may comprise a nonwoven web composed of a plurality of randomly deposited hydrophobic thermoplastic meltblown fibers which are sufficiently bonded or otherwise connected to one another to provide a substantially vapor impermeable and substantially liquid impermeable web. The backsheet may also comprise a vapor permeable nonwoven layer which has been partially coated or otherwise configured to provide liquid impermeability in selected areas.

For the purposes of the present invention, a substantially liquid impermeable material is constructed to allow the passage of not more than about 0.05 ml of water within 5 sec after applying a static pressure head of 70 cm of water to the material. Also for the purposes of the present invention, a substantially fluid impermeable or vapor impermeable material is constructed to provide a water vapor transmission rate (WVTR) of not more than about 30 g /m$^2$/24 hr. A suitable technique for determining the WVTR value is the WVTR Test, which is described in further detail herein below.

Topsheet 30 is typically composed of a liquid permeable, substantially hydrophobic fibrous material, such as a spunbonded web composed of synthetic polymer filaments. Alternatively, topsheet 30 may comprise a meltblown web or a bonded-carded-web composed of synthetic polymer filaments. Suitable synthetic polymers include, for example, polyethylene, polypropylene and polyesters. In a particular aspect of the invention, the polymer filaments have a tex (denier) within the range of about 0.167 tex (1.5d) - 0.78 tex (7d), and preferably have a tex (denier) within the range of about 0.167 tex - 0.33 tex (1.5-3d) to provide improved performance. The filaments are arranged to form a layer having a basis weight within the range of about 20-34 g/m$^2$, and preferably are arranged to have a basis weight of about 27 g/m$^2$. In addition, the topsheet layer has a bulk thickness within the range of about 0.0203-0.0432 cm (about 0.008-0.017 inches), and preferably has a bulk thickness within the range of about 0.0254-0.305 cm (about 0.010-0.12 inches) for improved effectiveness. The bulk thickness is measured under a restaining pressure of 0.096 kPa (0.014 psi).

Topsheet 30 may optionally be treated with surfactants to adjust its degree of hydrophobicity and wettability. It can also be selectively embossed or apertured with discrete slits or holes 21 extending therethrough.

Absorbent body 40 typically includes a pad composed of airlaid, cellulosic fibers commonly referred to as wood pulp fluff. Other natural fibers, such as cotton, may also be employed to form the pad. Conventional absorbent pads can have a density ranging from about 0.05 - 0.20 g/cm$^3$, and are sufficiently flexible to readily conform to the body of the wearer. Absorbent body 40 may also include a coform material composed of a mixture of cellulosic fibers and synthetic polymer fibers. For example, the coform material may be composed of an airlaid blend of cellulosic fibers and meltblown polyolefin fibers, such as polyethylene and/or polypropylene fibers. Particular examples of the coform material include 2-15 wt% of polyethylene and/or polypropylene fibers. In one aspect of the invention, the fibrous material comprising absorbent body 40 is composed of filaments having a coarseness of about 10 - 20 mg/100 meters, and preferably having a coarseness within the range of about 10 - 18 mg/100 meters. The filaments are arranged to form a layer having a basis weight within the range of about 400 - 1200 g/m$^2$, preferably having a basis weight of about 800 g/m$^2$. In addition, the absorbent body material typically has a bulk thickness within the range of about 0.432-0.533 cm (about 0.17-0.21 inches), as measured under a restraining pressure of 0.47 kPa (0.068 psi).

Absorbent body 40 may also include an effective amount of an inorganic or organic high-absorbency (e.g. superabsorbent) material to enhance the absorptive capacity of the absorbent body. For example, absorbent body 40 can contain 5 - 95 weight percent high-absorbency material, and preferably includes about 10 - 30 weight percent of the high-absorbency material to provide more efficient performance. Suitable inorganic high-absorbency materials include, for example, absorbent clays and silica gels. Organic high-absorbency materials can include natural materials, such as agar, pectin, guar gum and peat moss, as well as synthetic materials, such as synthetic hydrogel polymers. Such hydrogel polymers include, for example, carboxymethylcellulose, alkali metal salts of polyacrylic acids, polyacrylamides, polyvinyl ethers, hydroxypropyl cellulose, polyvinyl morpholinone, polymers and copolymers of vinyl sulfonic acid, polyacrylates, polyacrylamides, polyvinyl pyridine and the like. Other suitable polymers include hydrolyzed acrylonitrile grafted starch, acrylic acid grafted starch, and isobutylene maleic anhydride copolymers, and mixtures thereof. The hydrogel polymers are preferably lightly cross-linked to impart desired levels of water insolubility to the material. Crosslinking may, for example, be by irradiation or by covalent, ionic, Van der Waals, or hydrogen bonding. Suitable materials are available from various commercial vendors, such as Dow Chemical Company, Hoechst Celanese Corporation, Allied-Colloid, and Stockhausen. Typically, the high-absorbency material is capable of absorbing at least about 15 times its weight in water, and preferably is capable of absorbing at least about 25 - 50 times its weight in water.

The high-absorbency material can be distributed or otherwise incorporated into absorbent body 40 by employing various techniques. For example, the high-absorbency material can be incorporated into a separate carrier sheet which is layered with a body of airlaid cellulosic fibers. Alternatively, the high-absorbency material may be substantially uniformly distributed within the mass of fibers comprising the absorbent body. The material can also be non-uniformly distributed among the fibers to form, for example, a generally continuous gradient with either an increasing or decreasing concentration of high-absorbency material, as determined by observing the concentration moving from the body-side of absorbent body 40 toward the outer-side of the absorbent body. The high-absorbency material may also comprise one or more discrete layers or strips selectively segregated from the fibrous material of absorbent body 40.

The high-absorbency material can itself be configured in various particle shapes. For example, particles of high-absorbency material may be configured in the form of granules, flakes, fibers, or the like.

Optionally, a substantially hydrophilic tissue wrap 42 may be employed to help maintain the integrity of the airlaid fibrous structure of absorbent body 40. The tissue wrap sheet is typically placed about the absorbent body over at least the two major facing surfaces thereof, and composed of an absorbent cellulosic material, such as creped wadding or a high wet-strength tissue. In one aspect of the invention, the tissue wrap can be configured to provide a wicking layer which helps to rapidly distribute liquid over the mass of absorbent fibers comprising the absorbent body. In another aspect of the invention, the wrapsheet material on one side of the absorbent fibrous mass may be bonded to the wrapsheet located on the opposite side of the fibrous mass. The bonds are positioned at discrete, separate regions and extend through the thickness of the fibrous mass. Such a configuration effectively shapes the wrapsheet to form a plurality of individual "funnels" or "quilts" which can help to direct liquids into the interior of the fibrous mass and provide a more rapid absorption of the liquid. An effective embodiment may further include a plurality of holes or apertures formed at least partially through the thickness of the fibrous mass. The embodiment is configured such that the bonding of the oppositely positioned layers of wrapsheet material occurs through these holes or apertures. The apertures limit the amount of intervening fibrous material, and allow a more direct bonding between the wrapsheet layers. The bonding can comprise adhesive bonds, sonic bonds, thermal-bonds, or the like.

In particular embodiments of the invention, spacing means, such as at least one liquid permeable, separation layer 50, can be interposed in facing, adjacent relation between topsheet 30 and absorbent body 40. An effective spacing means is configured to be liquid permeable while retaining and holding as little of the liquid as practicable. As a result, the spacing means can maintain a relatively dry region interposed between the wetted absorbent body and topsheet 30. The spacing means can also be advantageously configured to provide a regular or irregular network of void spaces or channels to facilitate the movement of air within the diaper. In the shown embodiment, separation layer 50 is composed of a nonwoven fibrous web composed of natural fibers and/or synthetic polymer fibers. Suitable fibers include, for example, acrylic fibers, nylon fibers and blends thereof. Other suitable polymer fibers may, for example, be composed of a polyolefin, such as polyethylene, polypropylene, polyester or blends thereof. As an example, the web may be a composite of polypropylene fibers and polyethylene fibers. The polymer fibers are typically hydrophobic, but may be treated with a selected amount of surfactant to adjust the wettability thereof. When treated with surfactant, however, the separation layer should still be less hydrophilic than the material comprising absorbent body 40. The presence of an effective amount of the surfactant can advantageously increase the rate of movement of liquid into absorbent body 40 during the initial discharges of liquid into the absorbent article.

Thickness is an important parameter for separation layer 50, and can be measured under both a low constraining pressure (0.207 kPa) and a high constraining pressure (50.37 kPa). A suitable device for performing the high pressure (50.37 kPa) thickness measurement is a Testing Machine, Inc., Model 49 - 70

Bulk Testing Apparatus with a 1.59 cm diameter platen. The low pressure, 0.207 kPa (0.03 psi) thickness measurement can be performed with thickness measuring apparatus which employs a circular, 7.62 cm (3 inch diameter) platen to exert a pressure of 0.207 kPa (0.03 psi) onto a sample placed on a non-resilient, rigid surface. For example, a suitable instrument for measuring bulk thickness at the low pressure included a Starrett® granite surface plate, which is available from L. F. Starrett Company, located in Aphol, Massachusetts. The instrument further included a movable 7.62 cm diameter platen actuated by a Clipper air valve foot petal assembly, Catalog #3C30A2-S, which is available from Linemaster Switch Corporation, located in Woodstock, Connecticut. The thickness readout was provided by a Digimatic Indicator manufactured by Mitutoyo Manufacturing Company Limited, Japan, and distributed by MTI Corporation of Paramus, New Jersey. The indicator has a range between 0.0025 - 5.08 cm (0.001 - 2.0 inches).

To provide a desired degree of effectiveness, separation layer 50 has a dry bulk thickness dimension (at 0.207 kPa) of at least about 0.04 cm, and preferably has a dry bulk thickness within the range of about 0.07 - 0.51 cm. When measured at 50.37 kPa, separation layer 50 has a dry bulk thickness of at least about 0.025 cm, and preferably has a dry bulk thickness within the range of about 0.025 - 0.1 cm. If separation layer 50 is too thin, it may not provide a sufficient amount of separation and spacing between topsheet 30 and absorbent body 40. Similarly, if the combined bulk thickness of topsheet 30 and separation layer 50 is too thin, there may be insufficient separation and spacing between absorbent body 40 and the skin of the wearer. Accordingly, separation layer 50 and topsheet 30 have a combined bulk thickness (at 0.207 kPa) of at least about 0.078 cm, and preferably have a combined bulk thickness within the range of about 0.1 - 0.6 cm. When measured at 50.37 kPa, the combined bulk thickness of topsheet 30 and separation layer 50 is at least about 0.039 cm, and preferably is within the range of about 0.039 - 0.12 cm.

The separation layer can have a basis weight of at least about 25 g/m$^2$. In particular aspects of the invention, the basis weight is at least about 34 g/m$^2$, and preferably is at least about 55 g/m$^2$ to provide improved effectiveness. In other aspects of the invention, the basis weight is not more than about 170 g/m$^2$, and preferably, is within the range of about 55 - 170 g/m$^2$. To maintain a desired effectiveness of separation layer 50, the separation layer should be capable of sustaining its spacing function even after being wetted by urine or other aqueous liquids discharged from the wearer and after being subjected to the typical pressures exerted by the wearer during use.

In a particular aspect of the invention, the separation layer is configured to maintain a desired level of dryness. In particular, the separation layer material can be constructed to advantageously yield a desorption ratio of at least about 100. The desorption ratio can be determined as follows:

A separation layer sample measuring 5.08 x 5.08 cm (2inch x 2inch) in size is weighed and then immersed in a 0.9 percent saline solution for 1 minute. The saline is adjusted with Tween® 20 to provide a surface tension of approximately 0.00055 N/cm (55 dynes/cm). Tween 20, also called polysorbate 20, is a surfactant made by ICI Americas, Inc. of Wilmington, Delaware, and is composed of a mixture of laurate esters of sorbitol and sorbitol anhydride. The sample is removed from the saline solution, placed on a clip for suspension in a vertical position from a ring stand, and allowed to drip for 1 minute. After this 1 min drip period, the sample and any retained liquid are weighed. The sample is then placed on a desorption pad for 1 hour under a pressure of 3.45 kPa, which is applied over substantially the entire surface of the sample. The sample and any liquid remaining therein are weighed after the one hour desorption period. The desorption pad measures 5.08 cm x5.08 cm (2inch x 2inch), and is composed of a woodpulp fluff web having a basis weight of about 800 g/m$^2$ containing about 15 wt% of a superabsorbent polyacrylate, hydrogel material.

The desorption ratio is calculated as follows:

Desorption ratio = A/B

Where:

A = weight gain of sample after the saturation/drip process.
B = weight gain of sample after the 1 hour desorption process.

The fibers comprising separation layer 50 are configured to have a tex (denier) within the range of about 0.167-1.67 tex (about 1.5-15d), and preferably have a tex (denier) within the range of about 0.167-0.67 tex (about 1.5-6d). In addition, separation layer 50 is constructed to have a basis weight of at least about 34 grams per sq. meter (g/m$^2$), and preferably has a basis weight within the range of about 55 - 170 g/m$^2$. The separation layer can also have a bulk density (at 0.207 kPa) which is within the range of about 0.03 - 0.5 g/cm$^3$ and preferably is within the range of about 0.07 - 0.5 g/cm$^3$ to provide further advantages.

To maintain the desired effectiveness of separation layer 50, the separation layer should be capable of sustaining its above-described spacing function even when wetted by urine or other aqueous liquids discharged from the wearer. Accordingly, the wet compression recovery value of separation layer 50 is at least about 65%. Preferably, the wet compression recovery valu is at least about 80%, and more preferably is at least about 85% to provide improved performance.

The compression recovery value is a measure of the "springiness" or resilience of the material, and can be determined by the following procedure. The original thickness ($t_0$) of the separation layer material is first measured under a restraining pressure of 0.689 kPa (0.1 psi). After this measurement, the pressure on the separation layer material is gradually increased to 20.7 kPa (3 psi). The compressive pressure is then gradually reduced until the restraining pressure again reaches 0.689 kPa (0.1 psi). At this point, the bulk thickness is again measured at the 0.689 kPa (0.1 psi) restraining pressure to obtain a recovery thickness value ($t_R$). The compression recovery value is then determined in accordance with the following formula:

$$\text{Compression recovery value (CRV)} = (t_R/t_0) \times 100\%$$

A suitable instrument for determining the compression recovery value is a Standard Model Compressometer, which is distributed by Frazier Precision Instrument Co. of Gaithersburg, Maryland. For the purposes of the compression recovery test, the instrument is configured with a 2.54 cm (one inch) diameter foot.

When the above determination is made employing a dry separation layer, one obtains a dry compression recovery value. When the above determination is made employing a separation layer substantially saturated with distilled water, one obtains a wet compression recovery value. In a particular aspect of the invention, the separation layer has a dry CRV of at least about 65% and a wet CRV of at least about 65%. A preferred embodiment of the invention has a dry CRV and a wet CRV which both are at least about 80% to provide improved performance.

In a further aspect of the invention, the absorbent garment includes a plurality of two or more separation layers positioned in facing adjacent relationship and located between topsheet 30 and absorbent body 40. In particular, 2 - 5 individual separation layers may be located between the topsheet and the absorbent body. Fig. 2, for example, representatively shows an embodiment having three separation layers 50, 52, 54. It has been found that a plurality of separation layers may advantageously provide improved effectiveness with respect to reducing the amount of moisture at the wearer's skin. While not intending to be bound by any particular theory, it appears that the interstitial spaces between the individual separation layers can help isolate the wearer's skin away from the wet absorbent and help improve the movement of water vapor away from the wetted skin. In a particular embodiment of the invention, the separation layers can help facilitate the circulation of drier ambient air into the diaper through breathable panel 70.

The individual separation layers are distinct and separate from each other, but may be joined at selected, limited locations to maintain the integrity of the assembly. For example, the individual separation layers 50, 52, 54 may be spotbonded to each other at limited, discrete locations 46. The multiple separation layers have a combined, total bulk thickness (measured dry at 0.207 kPa) of at least about 0.04 centimeters, and preferably have a combined total bulk thickness within the range of about 0.07 - 0.51 cm. When measured at 50.37 kPa, the combined separation layers have a total dry bulk thickness of at least about 0.025 cm, and preferably have a total dry bulk thickness within the range of about 0.025 - 0.1 cm. In addition, the total bulk thickness (at 0.207 kPa) of topsheet 30 in combination with the multiple separation layers is at least about 0.078 cm, and preferably the combined total bulk thickness is within the range of about 0.1 - 0.6 cm. When measured at 50.37 kPa, the combined bulk thickness of topsheet 30 and the multiple separation layers is at least about 0.039 cm, and preferably the combined bulk thickness is within the range of about 0.039 - 0.12 cm. The multiple separation layers, in combination together, should exhibit a composite desorption ratio of at least about 100 when tested by the above-described desorption procedure. The multiple separation layers can have a combined effective basis weight of at least about 25 g/m$^2$. In particular aspects of the invention, the combined effective basis weight is at least about 34 g/m$^2$ and preferably is at least about 55 g/m$^2$. In other aspects of the invention, the combined effective basis weight is not more than about 170 g/m$^2$ and preferably, is within the range of about 55 - 170 g/m$^2$ The multiple separation layers can further have an effective bulk density (measured at 0.207 kPa) which is within the range of about 0.03 - 0.5 g/cm$^3$ and preferably is within the range of about 0.07 - 0.5 g/cm$^3$.

The separation layers may extend completely or partially over the adjacent surface area of absorbent body 40. Preferably, the separation layers are positioned over the intermediate section 16 of disposable diaper 10, and are substantially centered side-to-side with respect to the longitudinal centerline 18 of the disposable diaper. The separation layers extend over about 35 - 100% of the total longitudinal length of diaper 10, and extend over about 50 -100% of the width of the diaper, as measured at the narrowest portion of the diaper intermediate section 16. In the illustrated embodiment of the invention, the separation layers extend over a cross-directional width of about 12.7 cm and extend over a longitudinal length of about 38.1 cm.

In a particular embodiment of the invention, the separation layer or layers can be limited to a front two-thirds section of the diaper. In yet another embodiment of the invention, the separation layers can be limited to a medial 35 - 60% portion of the longitudinal length of diaper 10, and may be offset lengthwise towards the front waistband section of the diaper.

In the embodiment of the invention employing multiple separation layers, the individual separation layers may extend over the same or different areas. For example, separation layer 50 may cover a larger surface area than separation layer 52, and separation layer 52 may cover a larger surface area than separation 54. The individual separation layers may also be composed of different materials. For example, each of the separation layers could be composed of a different polymer fiber, or could be composed of the same polymer fiber but have different basis weights.

The multiple separation layers have a composite compression recovery value when dry of at least about 65% and preferably have a composite, dry CRV of at least about 80%. In addition, the multiple separation layers have a composite wet CRV of at least about 65%, and preferably have a combined, wet CRV of at least about 80% to provide improved effectiveness.

While not intending to be bound by any particular theory, it is believed that the presence of the separation layer (or layers) can advantageously provide a more effective spacing of the wearer's skin away from the wet absorbent pad and can provide improved circulation of moist air and water vapor away from the region immediately adjacent the wearer's skin. In conventional designs, the closer proximity of the skin to the wetted absorbent body can produce an occlusive effect which helps trap and hold the moist, humid air against the skin. The incorporation of an effective separation layer, however, can help provide more open spaces and irregular channels which better allow the humid air to move away from the wetted region of the absorbent body and allow drier air; e.g., from the waistband sections of the article; to circulate into the wetted region. The drier air can then help reduce any excessive hydration of the skin.

A breathable panel 70, which is substantially liquid impermeable but vapor permeable, can be located in at least one waistband section of diaper 10 to provide distinctive advantages and improvements. Particular embodiments of the invention can optionally incorporate the breathable panel in combination with the separation layer (or layers) discussed above. In the shown embodiment, the breathable panel is constructed to extend from backsheet 20 at the diaper front waistband section 12. Alternatively, a breathable panel may be located at the diaper rear waistband section 14, or breathable panels 70 may be located at both the front and rear waistband sections of diaper 10. Breathable panel 70 is substantially liquid impermeable, but is significantly more vapor permeable than backsheet layer 20. In particular, the breathable panel may comprise a material having a water vapor transmission rate (WVTR) value of at least about 2,000 g/m$^2$/24 hrs. Preferably, the breathable panel has a WVTR of at least about 4,000 g/m$^2$/24 hrs, and more preferably has a WVTR of at least about 5,000 g/m$^2$/24 hrs to provide improved performance. In addition, breathable panel 70 has an effective breathable area of at least about 22 cm$^2$. In particular aspects of the invention, the effective breathable area is at least about 45 cm$^2$, and preferably the effective breathable area is within the range of about 45 - 400 cm$^2$ to provide further advantages.

The effectiveness of the breathable panel can be advantageously improved by positioning at least a section of the breathable panel in an adjacent, overlying relation with respect to a selected waistband portion of absorbent body 40. It has been found that such an overlying registry can more effectively reduce skin hydration, and can better cooperate with any separation layer or layers to help remove humidity from the area adjacent the wearer's skin and circulate drier air to the skin area covered by the wetted absorbent body. The configuration of the present invention distinctively provides a substantially fluid impermeable backsheet in the intermediate, crotch section of the diaper and limits the breathable panel sections to the waistband sections of the diaper, which are relatively remote from the target regions of the absorbent body that typically receive direct wetting from the wearer. As a result, lesser amounts of the relatively expensive breathable panel material are needed. It is noted that conventional diaper designs have employed outer covers totally composed of a breathable but liquid impermeable material, such as microporous polymer film. Such designs have been configured to evaporate water from a wetted absorbent pad through the breathable outer cover and thereby dry the pad and regenerate its absorbent capacity. The diaper designs, however have been expensive to manufacture, and can exhibit a cold, clammy feeling on the diaper due to the moisture evaporating from the surface of the outer cover.

In contrast to ordinary designs, it has been discovered that the objective of reducing skin hydration can be better accomplished by restricting the breathable portion of the outer cover to overlie the absorbent body at the more remote waistband sections of the diaper. It has been found that directing air movement through the dry sections of the absorbent can be more effective with respect to reducing skin hydration.

about 2 - 18 centimeters. In a particular aspect of the invention, breathable panel 70 extends over at least about 10%, and preferably over at least about 15%, of the longitudinal length of the absorbent body to provide improved performance. In another aspect of the invention, the breathable panel can be constructed to extend over not more than about 40%, and preferably over not more than about 30% of the length of the absorbent body to provide further advantages. The shown embodiment of panel 70 extends over about 20% of the longitudinal length of absorbent body 40, beginning at the terminal, front waistband edge of the absorbent body. While the illustrated embodiment shows a breathable panel which extends completely to the terminal, waistband edge of the diaper article, it should be readily appreciated that the extent of panel 70 along the diaper longitudinal direction may optionally stop short of the terminal, waistband edge.

Referring to Fig. 3, the effectiveness of the present invention can be improved by constructing absorbent body 40 to include a humidity transfer region 44 which is positioned in an operable, adjacent registration with breathable panel 70. The humidity transfer region has a relatively low moisture retention, as compared to the other sections of the absorbent body where liquid is normally held and stored. For example, the humidity transfer region may comprise a substantially hydrophobic, nonwettable fibrous material, such as layer or other suitable mass of polyester fibers.

In a particular aspect of the invention, the humidity transfer region has a Moisture Retention Index of not more than about 40 g . Preferably, the humidity transfer region has a Moisture Retention Index of not more than about 30 g , and more preferably, has a Moisture Retention Index of not more than about 20 g . The low Moisture Retention Index of the humidity transfer region can advantageously help limit the occluding effect produced by presence of held liquids. As a result, water vapor can more readily escape from the spaces adjacent the wearer's skin.

The humidity transfer region can also be advantageously configured to have a Wicking Index of not more than about 0.2 g . Preferably, the humidity transfer region has a Wicking Index of not more than about 0.1 g and more preferably, has a Wicking Index of not more than about 0.05 g to provide improved effectiveness. The relatively low Wicking Index of the humidity transfer region helps to limit the presence of liquid which could inhibit the movement of water vapor away from the wearer's skin.

In another aspect of the invention, the humidity transfer region can be composed of a composite structure. For example, the humidity transfer region can comprise a multi-layer composite composed of one or more cellulosic tissue layers, nonwoven fibrous polymer web layers, woven fabric layers or combinations thereof. Each of the layers may be wettable or nonwettable, as desired.

The humidity transfer region, in one embodiment of the invention, has a density of not more than about 0.1 g/cm$^3$ and in another embodiment of the invention, the density of the humidity transfer region is not less than about 0.001 g/cm$^3$. Preferably, the humidity transfer region has a density within the range of about 0.001 - 0.05 g/cm$^3$ to provide improved effectiveness. In a further aspect of the invention, the humidity transfer region can have an average basis weight of not more than about 550 g/m$^2$ and preferably has an average basis weight within the range of about 5 - 300 g/m$^2$ improved performance. To further assist in its effectiveness, the humidity transfer zone can be configured with a bulk thickness of not less than about 0.051 cm (about 0.02 in), when measured dry at 1.38 kPa (0.2 psi). Preferably, the humidity transfer region has a bulk thickness of not less than about 0.203 cm (about 0.08 in.), and more preferably, has a bulk thickness of not less than about 0.254 cm (about 0.10 in.) to better assist in reducing skin hydration. A particular aspect of the invention comprises a configuration wherein the humidity transfer region has a Frazier air porosity value of at least about 15.25 m$^3$/min/m$^2$, and another aspect of the invention comprises an arrangement wherein the humidity transfer region has a Frazier air porosity value within the range of about 15.25 -30 m$^3$/min/m$^2$.

Humidity transfer zone 44 is located at a waistband section of absorbent body 40 and can be arranged in various suitable configuration. For example, the humidity transfer region may be constructed to extend from one longitudinal end of the absorbent body and span across the entire cross-directional width of the absorbent (Fig. 3 and 7). The humidity transfer region may alternatively span only partially across the width of the absorbent body, as illustrated in Fig. 8 and 10. In the embodiment of Fig. 10, the humidity transfer region occupies a generally rectangular notch-shaped area formed into absorbent body 40, but the occupied area may optionally be configured with any other suitable regular or irregular shape, such as the circle illustrated in Fig. 8.

In an optional configuration of the invention, absorbent body 40 can include a single aperture or a plurality of apertures 43 through the thickness dimension of the absorbent body, with at least a portion of the apertures located in operable registration with breathable panel 70 (Fig.3). The apertures may, for example, be circular in shape with diameters within the range of about 0.5 - 2.0 cm. Apertures of other, different shapes may also be employed to provide an operable humidity transfer region to aid the operation of breathable panel 70.

Other components of diaper 10, such as topsheet 30, separation layers (50, 52, 54) and other liquid management layers, may or may not extend over the area occupied by humidity transfer region 44. In the illustrated embodiment, these liquid-managing layers are configured to extend in a generally adjacent and facing relation with the humidity transfer region.

The article of the present invention can advantageously be constructed to reduce the excessive hydration of the wearer's skin and to reduce the relative humidity in the environment adjacent the wearer's skin. In a particular aspect of the invention, the breathable panel is constructed of a material which provides a Test Relative Humidity (TRH) value of not more than about 80%. Preferably, the breathable panel material is constructed to provide a TRH value of not more than about 75% to deliver improved performance. The reduced values of relative humidity can help allow the skin to dehydrate and recover towards its normal, ambient level of hydration.

In another aspect of the invention, diaper 10 can advantageously be constructed to provide for a mean net skin hydration value (mean net SHV) of not more than about 0.8 g /m$^2$ in 2 min. Preferably, the diaper is constructed to provide a mean net SHV of not more than about 0.5 g /m$^2$ in 2 min. for improved effectiveness. Such mean net SHV's are indicative of lower levels of skin wetness as compared to the excessive levels of skin wetness which can occur in conventional diapers after they have been wetted. The lower levels of skin wetness can help make the skin less susceptible to abrasion and less susceptible to chemical or biological irritants.

A suitable technique for determining the WVTR (water vapor transmission rate) value of a material is ASTM E96-80. For the purposes of the present invention, 7.62 cm (3") diameter circular samples are cut out of the test material and out of a control material, Celguard® 2500 (Hoechst Celanese). Five samples are prepared for each material. The test dish is a No. 60-1 Vapometer pan distributed by Thwing - Albert Instrument Company, Philadelphia, Pennsylvania. One hundred milliliters of water are poured into each Vapometer pan, and each of the samples of the test materials and control material are placed across the open top area of an individual pan. Screw-on flanges are tightened to form a seal along the edges of the pans, leaving the associated test material or control material exposed to the ambient atmosphere over a 6.5 cm diameter circular area (an open, exposed area of about 33.17 cm$^2$) . The pans are placed in a forced air oven set at 37.78°C (100°F) for 1 hour to equilibriate. The oven is a constant temperature oven with external air circulating through it to prevent water vapor accumulation inside. A suitable forced air oven is, for example, a Blue M Power-O-Matic 60 oven distributed by Blue M Electric Co. of Blue Island, Illinois. Upon completing the equilibration, the pans are removed from the oven, weighed and immediately returned to the oven. After six hours, the pans are removed from the oven and weighed. The preliminary, test WVTR value is calculated as follows:

Test WVTR = (grams weight loss over 6 hours) x 1263 (g/m$^2$/24 hours)

The relative humidity within the oven is not specifically controlled.

Under predetermined set conditions of 37.78°C(100°F) and ambient relative humidity, the WVTR for Celguard 2500 has been determined to be 5000 g /m$^2$/24 hours. Accordingly, Celguard 2500 is run as a control sample with each test, and the preliminary test values are corrected to the set conditions using the following equation:

WVTR = (test WVTR/control WVTR) x 5000 g /m$^2$/24 hr.

Celguard 2500 is a 0.0025 cm thick film composed of a microporous polypropylene.

The Frazier Porosity values referred to in the present specification can be determined employing a Frazier Air Permeability Tester (Frazier Precision Instrument Co., Gaithersburg, Maryland) and Method 5450, Federal Test Methods Standard No. 191A. For the purposes of the present invention, the test is conducted with a sample which measures 20.32 cm x 20.32 cm (8" x 8").

The Test Relative Humidity (TRH) value of a structure can be determined by employing the following TRH test apparatus and procedure:

As schematically shown in Fig. 4, the TRH test apparatus includes a temperature controlled chamber 80 and a relative humidity (RH) box 82. The temperature controlled chamber measures 45.72 cm x 68.58 cm x 91.44 cm (18" x 27" x 36") to enclose a volume of about 0.283 m$^3$ (10ft$^3$),and is maintained at a temperature of 32.22°C (90°F). The relative humidity within the chamber is dependent upon ambient conditions.

The RH box is open on the top and is made of 0.635 cm (1/4") thick plexiglass with outside dimensions of 11.43 cm x 11.43 cm x 13.97 cm(4.5"x 4.5" x 5.5") and a volume of about 1310.96 cm$^3$(80 in.$^3$) when a sample is in place. The box may be partially filled with plastic spheres(1.9 cm (0.75 inch) diameter) to reduce the volume of air within the RH box. The box has a circular hole 84 on one side through which an RH probe 86 is inserted, and includes a narrow ledge 88 positioned approximately 0.635 cm (1/4 inch) from the top edge. The test sample 92 is supported upon the ledge. The RH and temperature probes employed to measure and record relative humidity and temperature are manufactured by Solomat Corporation, Stamford, Connecticut. The particular instruments which can be employed are the MPM2000 Modular System with M2013 Modumeter, the MPM Data Logger, the 155RH Fast Response Probe for measuring relative humidity, and the PP206 SF Flexible Patch Thermo-couple Probe for measuring temperature.

A sufficient number of 10.16 cm x 10.16 cm (4" x 4") absorbent squares 90 are prepared with each absorbent square composed of about 800 g/m$^2$ basis weight wood pulp fibers and about 15 weight percent superabsorbent particles, such as particles of a polyacrylate superabsorbent. A tissue wrap composed of absorbent cellulosic material is placed on both sides of each absorbent square.

Samples of test materials 92 are cut into 12.7 cm x 12.7 cm (5" x 5") squares. An additional test sample composed of Celguard 2500 (Hoechst Celanese), which has a WVTR of 5000 g/m$^2$/24 hours, is prepared and run as a control sample.

The relative humidity box, the Solomat relative humidity and temperature probes, the absorbent squares, the samples of test materials, and a quantity of isotonic saline (0.9 wt% sodium chloride) are allowed to equilibrate within the temperature control chamber.

A selected absorbent square is removed from the temperature control chamber, weighed and then placed back into the chamber. The temperature and relative humidity within the RH box are recorded, and the Solomat Data Logger is turned on to start recording relative humidity at one minute intervals. After two relative humidity data points are collected, the absorbent square and saline are removed from the chamber. An amount of saline equal to about 6 times the weight of the absorbent square is poured over the top of the absorbent square. The absorbent is then placed into the RH box, and a sample of test material is placed over the top of the box. A plexiglass holder 96 is employed to keep the sample on the box. The data logger reports relative humidity measurements at one minute intervals for sixty minutes, and the temperature inside the RH box is recorded. After the sixty minute test period, the sample of test material is removed, and the relative humidity and temperature inside the RH box are allowed to re-equilibrate with the chamber conditions before another sample is tested. When all of the samples have been tested, the data can be transferred from the data logger to a personal computer, printed and plotted. The test relative humidity (TRH) value for a particular sample is the relative humidity value measured at the sixty minute point.

A suitable technique for determining the Moisture Retention Index of a section of absorbent body material is as follows:

With reference to Fig. 5, a suitable testing apparatus for determining Moisture Retention Index includes an electronic balance 102, which is accurate to 0.01 g and has at least a 1000 g capacity. In addition, the balance has a digital signal output for use with a digital-to-analog converter 104 and a chart recorder 106. A second electronic balance is employed to weigh the test samples. A suitable electronic balance, for example, is a Mettler PC2200 manufactured by Mettler Instrument Company, a business having offices located in Hightstown, New Jersey. The digital-to-analog converter should be compatible with electronic balance 102 and chart recorder 106. For example, in the illustrated embodiment, the digital-to-analog converter is a Mettler GC47 D/A Converter. A suitable chart recorder is, for example, a Fisher Recordall Series 5000, which is available from Houston Instrument, a company having offices located in Austin, Texas.

The apparatus further includes a 500 milliliter aspirator bottle 108 for holding a suitable reservoir supply of synthetic urine 110. The aspirator bottle is configured with a size number 4 rubber stopper 112 and a 17.78 cm (7") glass air tube 114 which has an inside diameter of 5.58 mm (0.22 in.). Air tube 114 is positioned through a bore hole formed through the center of stopper 112, and is inserted until approximately 12.7 cm (5") of the air tube protrudes from the inside surface of the stopper.

Enlarged side and top views of absorbency test chamber 116 are representatively shown in Figs. 5A and 5B. The test chamber is composed of a suitable material, such as lucite, and has a substantially square base area measuring 10.16 cm x 10.16 cm (4"x4"). The chamber includes a 10.16 cm x 10.16 cm (4"x4") base member 138, and a 1.59 cm (5/8") high wall member 140 situated along each of the four sides of the base member. A 125 gram cover 124 is configured for placement over the sample placed within chamber 116. The cover extends over a generally square area and is configured to be slightly smaller than the top opening into chamber 116. Accordingly, the cover can sufficiently prevent the evaporation of moisture, and can readily slip along the walls of the chamber to provide a selected pressure onto the top of a sample placed therein. A stepped, circular recess 142 is formed into the top of base 138, and conduit 144 extends through the base to a 0.635 cm (0.25") inside diameter outlet tube 136. Conduit 144 conducts liquid into the bottom of recess 142 where it is then transmitted through a multiport transfer disk to a test sample 126.

Within the test chamber, a 3.175 cm (1.25") diameter multiport plate 122 composed of lucite sits in recess 142 r sting on top of th step therein. The multiport plate includes 7 ports, each being 3 mm in diameter, with one port located in the center of plate 122 and the remaining six ports arranged radially from the center port and equally spaced circumferentially around the center port along an about 3.016 cm (about 1 3/16") diameter circle. The seven ports are positioned 0.95 cm (3/8") apart center-to-center, and plate 122 is centrally located within chamber 116. Plastic tubing having a 0.635 cm (0.25 inch)inside diameter, such as Tygon tubing - R3603, interconnects outlet tube 130 of reservoir bottle 108 and tube 136 which enters base 138. Plastic tubing 128 has an approximate total length of 2.25 m (7.5') but the exact lengths are not critical. The tubing lengths should allow for easy use of the apparatus, but should not be excessive. A control valve, such as a two-way polypropylene stopcock 132, regulates the liquid flow through plastic tubing 128. Stopcock 132 has a bore size of 4 millimeters so as not to excessively restrict liquid flow. Laboratory jacks are employed to regulate the vertical positioning of the components of the testing apparatus. In particular, laboratory jack 118 supports electronic balance 102 and reservoir bottle 108, while laboratory jack 120 supports test chamber 116 and the components contained therein. Laboratory stands 148 and 149 can be employed to make any large, coarse adjustments of the vertical positions of the components of the testing apparatus.

The testing apparatus should be clean and free from bacterial contamination and salts which may have settled out of the synthetic urine. During testing, the test equipment should not be handled. If the tubing is removed or handled, an equilibration time of approximately 1 hour should be employed to allow relief of any stresses imparted to the tubing. This equilibration time should also be allowed when refilling reservoir bottle 108. The tubing should not be touched during testing. The absorbent material being tested should be preconditioned at "standard" conditions of 50±2% RH and 23±1 degrees Centigrade. The appointed body side of the absorbent material should be positioned facing multiport plate 122. Any detergents employed to clean any components of the test apparatus should be completely removed so as not to affect the surface tension of the synthetic urine employed to conduct the tests.

Prior to testing, reservoir bottle 108 is filled with synthetic urine and a portion of the liquid is drained through the tubing to completely remove all air bubbles from the tubing and from the fluid conduits in the testing apparatus. The drained synthetic urine is discarded and the stopcock is closed to stop the flow of liquid. The reservoir bottle is then refilled. Plastic tubing 128 should be free of sharp bends or kinks which might impede the flow of liquid and alter the test results.

Prior to testing, the equipment is also adjusted to establish a zero head. First, chamber 116 is leveled by placing an suitably sized bubble level indicator in the center of the chamber and by pushing slightly on the appropriate side of laboratory jack 120. The front and back of chamber 116 should also be leveled. At this point, testing chamber 116 may be taped in place on laboratory jack 120. Stopcock 132 is then opened to permit liquid flow, and a slightly concave meniscus is created in each of the seven 3 mm ports in plate 122 by adjusting the height of laboratory jack 120. Zero head is obtained when each of these ports contains synthetic urine with a slightly concave meniscus, and an air bubble is maintained at the bottom of glass tube 114 within reservoir bottle 108. Stopcock 132 is then closed to stop the flow of liquid and chamber 116 is checked to make sure that it is still level. The apparatus is then allowed to equilibrate for 3-6 hours. This equilibration time is not necessary when the testing apparatus is in continuous use and the liquid has not been changed or added. Chart recorder 106 is turned on and adjusted to plot at zero when the electronic balance 102 is at its zero setting.

The equilibrium setting of the testing apparatus is checked by placing cover 124 on chamber 116 and closing stopcock 132. Electronic balance 102 is then zeroed and the chart recorder is turned on. The testing apparatus is at equilibrium if the absorbed fluid weight reading is stable at zero. Preferably, the absorbed fluid weight reading should not vary by more than plus or minus 0.03 g in 15 minutes.

Test sample 126 is configured in the shape of a 7.62 cm (3") diameter disk. The sample is weighed to the nearest 0.01 gram and the weight is recorded. The thickness of the sample is measured with a 7.62 cm (3 inch) diameter platen under a restraining pressure of 1.38 kPa (0.2 psi).

A 7.62 cm (3 inch) diameter piece of filter paper, such as Whatman No. 4 filter paper, is centered over multiport plate 122 within chamber 116. Stopcock 132 is then opened to wet out the filter paper and remove all air bubbles. It should be noted that a new piece of filter paper is used for each test sample. The stopcock is then closed to stop the flow of liquid, and excess fluid is blotted from the edges of the filter paper. The center of the filter paper, however, is not blotted so as to avoid forming any air bubbles. The areas around filter paper 134 and cover 124 should both be dry. Stopcock 132 is opened and electronic balance 102 is zeroed out once it stabilizes.

The test is started by simultaneously placing and centering absorbent sample 126 over filter paper 134 with cover 124 resting on top of the sample, and turning on the chart recorder 106. Test sample 126 is then allowed to absorb fluid for a 30-minute testing period. At the end of this period, stopcock 132 is closed and chart recorder 106 is turned off. The final reading of the electronic balance is recorded on the chart paper to serve as a check of the chart recorder data. The Moisture Retention Index is the grams of synthetic urine absorbed by test sample 126 during the 30-minute test period.

A suitable technique for determining the Wicking Index of a single, generally homogeneous material or of a composite material is as follows:

With reference to the apparatus representatively shown in Fig. 6, the Wicking Test apparatus includes a chamber 150 having a 10.16 cm x 10.16 cm (4" x 4") base measurement. A 7.62 cm (3") diameter test sample 152 is weighed employing an electronic balance such as a Mettler PC2200 balance which is accurate to 0.01 gram. A 10.16 cm x 10.16 cm (4" x 4") piece of 0.0254 mm (1.0 mil) thick polyethylene film is place on the bottom of chamber 150, and a 7.62 cm (3") diameter piece of retention material 154 is placed on top of the polymer film. The retention material is composed of 3 layers of coform fibrous web material and superabsorbent particles. Each layer of coform material is composed of woodpulp fluff and 2 wt% meltblown polypropylene fibers. Contained within the coform material are about 1.69 g (range: 1.64 - 1.73 g ) of the superabsorbent material. The resultant retention material 154 has a total thickness of 1.9 cm (0.75") and a total basis weight of 900 g/m$^2$. The total dry weight of the retention material is about 4.84 g (range: 4.70 - 4.95 g ), of which 35 weight percent is superabsorbent material. The particles of superabsorbent material are composed of polyacrylate hydrogel polymer, such as SANWET IM-5000 manufactured by Hoechst Celanese.

After loading the retention material with 24.2 g (ml) of synthetic urine (5 gram/gram liquid loading), a 10.16 cm x 10.16 cm (4"x4") piece of screen material 156 is placed on top of retention material 154. The screen material is a fiberglass mesh screen having the screen strands arranged in a generally square-grid pattern with 18 openings per lineal 2.54 cm (inch) (324 openings per 6.45 cm$^2$ (sq.inch)) and a screen thickness of about 0.028 cm.

Test sample 152 is then placed on top of screen 156 and a 125 gram cover 158 is placed on top of the entire test sample 152 to impart a pressure of 0.268kPa (0.039 psi). The cover extends over a generally square area and is configured to be slightly smaller than the top opening into chamber 150. Accordingly, the cover can sufficiently prevent the evaporation of moisture, and can readily slip between the walls of the chamber to provide the selected pressure onto the top of a sample placed therein. Thirty minutes after placing weight 158 on top of test sample 152, the test sample is removed from chamber 150 and weighed to the nearest 0.01 gram. The difference between the dry sample weight and the "wet" sample weight after the 30 minute testing period is the amount of fluid "wicked" from the loaded retention material 154 into test sample 152. The amount of wicked liquid (in grams) is referred to as the Wicking Index.

Skin hydration values are determined by measuring total transepidermal water loss (TEWL), and can be determined by employing the following test procedure:

The test is conducted on partially toilet trained infants who have no lotions or ointments on the skin and have not been bathed within 2 hours prior to the test. Half of the selected group of infants is appointed to wear the test diaper first, and the control diaper second. The other half of the group of infants is appointed to wear the control diaper first, and the test diaper second.

Each test diaper is weighed before and after use to verify the volume of liquid added into the diaper. A felt tip pen is employed to mark an "X" at the target zone inside the diaper, with the "X" positioned 7.62 cm (3") below the top front edge of the absorbent pad and centered side-to-side. The TEWL measurements are taken with an evaporimeter, such as an Evaporimeter EP1 instrument distributed by Servomed AB, Stockholm, Sweden. Each test measurement is taken over a period of two minutes with TEWL values taken once per second (a total of 120 TEWL values). The digital output from the Evaporimeter EP1 instrument gives the rate of transepidermal water loss (TEWL) in g/m$^2$/hr. Skin hydration values (SHV) are in units of total amount of water loss per unit area measured during the two minute sampling period, and are calculated as follows:

$$\text{SHV (g /m}^2\text{ in 2 min)} = \sum_{n=1}^{120} (\text{TEWL})_n \times \frac{1}{120} \times \frac{1\ \text{hr}}{60\ \text{min}} \times 2$$

A preliminary skin hydration value measurement is taken on the infant's lower abdomen in a region corresponding to the target zone of the diaper using the evaporimeter for the purpose of establishing the initial skin hydration value of the infant's skin at the diaper target zone. A diaper is then placed on the infant. Prior to securing the diaper on the infant, a tub is positioned to direct a flow of liquid to hit the premarked target zone. Once the diaper is secured, 120 milliliters of adjusted saline (surface tension adjusted to 0.00055 N/cm (55 dynes/cm) using Tween 20) is added in two insults of 60 milliliters each at a rate of 15 milliliters/second. The time between insults is 30 seconds.

The infant wears the diaper for 30 minutes after which two skin hydration measurements are taken. A base-line measurement is taken at the upper thigh in a region of skin not covered by the diaper. This baseline SHV is compared with the preliminary SHV measurement to establish that the infant is not perspiring. The presence of perspiration can cause the SHV measurement to be artificially high. A test measurement of skin hydration is also taken on the lower abdomen corresponding to the target zone mark of the diaper. The used diaper is then weighed, and the infant is allowed to play in his/her cloth underwear for 25 - 30 minutes. The test procedure is then repeated for each infant using the diaper type (test or control) which the infant has not yet worn.

The control diaper provided a standardized basis for comparing the performance of the diaper configuration being tested and evaluated. In the tests conducted for the purposes of the present invention, the control diaper included an outer cover backsheet composed of 0.0254 mm (1 mil) thick polypropylene, and a topsheet layer composed of a spunbonded polypropylene nonwoven fibrous web having a basis weight of 27 g/m$^2$. The topsheet included 0.206 cm (0.081 in) diameter apertures formed therethrough across a central region of the topsheet at a frequency of about 76 apertures per 6.45cm$^2$ (sq.inch). The central region extended over a width of 8.89-12.7 cm (3.5-5") and extended along the full length of the diaper. An absorbent pad was located between the backsheet and topsheet layers, and was composed of woodpulp fluff which had a basis weight of about 800 g/m$^2$ and included about 15 wt% polyacrylate superabsorbent polymer particles. The pad also included a tissue wrap comprising an absorbent layer of cellulosic creped wadding material. A liquid transport layer was positioned between the topsheet and the absorbent pad, and was composed of a nonwoven spunbond fibrous web of polypropylene fibers having a basis weight of about 42 g/m$^2$. The control diaper was secured to the infant with adhesive tape fasteners, and included elasticized gathers at the leg and waist regions of the diaper.

Data is discarded for any infants which have added to the loading of saline solution. The value reported for the mean net SHV (grams/m$^2$ in two minutes) is the arithmetic mean for all infants of the post-wear skin hydration value taken at the lower abdomen (target zone mark) minus the skin hydration value measured at the upper thigh.

The net skin hydration value is determined as follows:

$$\text{Net SHV}_i = Y - Z$$

Where:

Y = skin hydration value measured at target zone mark of an individual infant

Z = baseline skin hydration value measured at leg, upper thigh of individual infant

$\text{SHV}_i$ = skin hydration value for individual infant

Then,

$$\text{Mean Net SHV} = \frac{\sum_{i=1}^{N} \text{Net SHV}_i}{N}$$

Where: N = number of infants in study

The percent reduction in skin hydration is determined as follows:

$$\%\ \text{Reduction} = \frac{\sum_{i=1}^{N} [((C-D)/C)x100]}{N}$$

Where:

C = Net $SHV_i$ for control diaper

D = Net $SHV_i$ for test diaper

N = number of infants in study

The following examples are presented to provide a more detailed understanding of the invention. The specific materials and parameters are exemplary, and are not intended to specifically limit the scope of the invention.

## Example 1

A disposable diaper was produced, comprising a backsheet layer that had a base section which was liquid and vapor impermeable, and an attached panel section which was liquid impermeable but vapor permeable. An absorbent body was sandwiched between a liquid permeable topsheet layer and the backsheet layer, and separation layers were located between the absorbent body and the topsheet layer. The diaper also included a hook and loop fastening system.

The base portion of the backsheet comprised a conventional, 0.0254 mm (1 mil) thick polyethylene film which was liquid and vapor impermeable. The breathable panel was attached to extend from the end of the base portion, and formed the front waistband section of the backsheet. The material used for the breathable panel was a laminate composed of 34 $g/m^2$ calendered fine fiber polypropylene meltblown, and 24 $g/m^2$ polypropylene spunbond which was thermally bonded with an approximately 12% bond area. The meltblown side of the fabric was next to the absorbent body, and the spunbond side was positioned to the outside of the diaper. This fabric material had a WVTR of approximately 5000 g/m2/24 hours. The breathable panel extended the full width of the diaper and extended longitudinally approximately 13 cm from the front edge of the diaper.

The absorbent body was composed of a mixture of woodpulp fluff and polyacrylate superabsorbent particles. The basis weight of the fluff was about 800 $g/m^2$ and the mixture contained about 15 wt% superabsorbent particles. In addition, the absorbent body included a tissue wrap of high wet-strength tissue.

The topsheet layer was configured for placement against the body of the wearer. Accordingly, the topsheet material was soft and nonirritating, and was composed of a 27 $g/m^2$ polypropylene spunbond nonwoven fabric.

In the hook-and-loop fastening system, the loop material was applied to the breathable panel 70 using adhesive only around the edges of the material to prevent occlusion of the breathable panel.

The separation layers were three layers of 42 $g/m^2$ polypropylene spunbond (total 126 $g/m^2$) providing a combined bulk thickness of 0.11 cm (measured at a pressure of .207 kPa) and a bulk density of 0.11 $g/cm^3$. The separation layers were 12.7 cm wide and were 16.5 cm in length with the front edge of the layers located 5 cm from the front edge of the absorbent. The layers were ultrasonically spot bonded to each other and to the topsheet at intervals of approximately 5 cm around the edges of the layers.

The diaper exhibited a mean net SHV of about 0.3 $grams/m^2$ in two minutes. This represented a 69% reduction in skin hydration, as compared to the conventional control diaper described herein above.

## Example 2

A diaper was produced comprising a backsheet that had a base section which was liquid and vapor impermeable, and an attached panel section which was liquid impermeable but vapor permeable. An absorbent body was sandwiched between the backsheet and a liquid permeable topsheet layer, and separation layers were located between the absorbent body and the top sheet.

The base portion of the backsheet comprised a conventional, 0.0254 mm (1 mil) thick polyethylene film which was both liquid and vapor impermeable. The breathable panel was attached to and extended from the end of the base portion, and formed the front waistband section of the backsheet. The material employed to construct the breathable panel was a 34 g/m$^2$ calendered fine fiber, polypropylene meltblown nonwoven fabric. This fabric had a WVTR of approximately 5000 g /m$^2$/24 hrs. The br athable panel extended the full width of the diaper and extended longitudinally approximately 13 centimeters from the front edge of the diaper.

The separation layers comprised three layers of 42 g/m$^2$ polypropylene spunbond (total 126 g/m$^2$) with a combined bulk thickness of 0.11 cm (measured at a pressure of 0.207 kPa) and a bulk density of 0.11 g/cm$^3$. The separation layers were 12.7 cm wide, and were 16.5 cm in length with the front edge of the separation layers located 5 cm from the front edge of the absorbent body. The separation layers were ultrasonically spot bonded to each other and to the top sheet at intervals of approximately 5 cm around the edges of the layers.

The diaper exhibited a mean net SHV of about 0.2 g /m$^2$ in two minutes. This represented a 70% reduction in skin hydration, as compared to the conventional control diaper.

## Example 3

This article was the same as in Example 2, except that the separation layers were 24 cm in length with the front edge of the layers located at the front edge of the absorbent body.

The diaper exhibited a mean net SHV of about 0.45 g /m$^2$ in two minutes. This represented a 56% reduction in skin hydration, as compared to the control diaper.

## Example 4

This article was the same as in Example 3, except that the separation layers were a polyester bonded-carded-web obtained from H.D.K., a company located in Rogersville, Tennessee. The web was composed of fibers which had a tex (denier) of about 0.61 (about 5.5) and were bonded together with approximately 16.6% powder adhesive. The combined basis weight of the three layers was about 108 g/m$^2$ the combined bulk thickness was 0.40 cm and the combined bulk density was 0.03 g/cm$^3$.

The diaper exhibited a mean net SHV of about 0.6 g /m2 in two minutes. This represented a 52% reduction in the mean net SHV, as compared to the control diaper.

## Example 5

A diaper was produced, comprising a backsheet layer that had a base section which was liquid and vapor impermeable, and an attached panel section which was liquid impermeable but vapor permeable. An absorbent body was sandwiched between the backsheet and a liquid permeable topsheet layer.

The base portion of the backsheet comprised a conventional, 0.0254mm (1 mil) thick polyethylene film which was liquid and vapor impermeable. A breathable panel was attached to and extended from the end of the base portion, and formed the front waist band section of the backsheet. The breathable panel was composed of a 34 g/m$^2$ calendered fine fiber polypropylene meltblown nonwoven fabric. This fabric had WVTR of approximately 5000 g /m$^2$/24 hrs. The breathable panel extended the full width of the diaper and extended longitudinally approximately 13 cm from the front edge of the diaper.

The diaper exhibited a mean net SHV of about 0.5 g /m$^2$ in two minutes. This represented a 40% reduction in skin hydration, as compared to the control diaper.

## Example 6

This article is the same as in Example 1, except that the separation layers extend from the front waist edge of the absorbent body to the rear waist edge of the absorbent.

## Example 7

This article is the same as in Example 6, except that the separation layers are composed of a polyester bonded-carded-web manufactured by H.D.K. The web is composed of fibers having a tex (denier) of about 0.61 (about 5.5) bonded together with approximately 16. 6% powder adhesive. The combined basis weight of the three separation layers is about 103 g/m$^2$, the combined bulk thickness is about 0.09 cm, and the combined bulk density is about 0.12 g /cm$^3$.

Example 8

A diaper is produced, comprising a backsheet that was liquid and vapor impermeable; a liquid permeable topsheet layer; an absorbent body located between the topsheet layer and backsheet layer; and separation layers located between the absorbent body and the topsheet layer.

The separation layers are three layers of 42 g/m$^2$ (each layer, total 126g/m$^2$) polypropylene spunbond with a combined bulk thickness of 0.11 cm and a bulk density of 0.11 g/cm$^3$. The separation layers are 12.7 cm wide and extend the full length of the absorbent body.

Example 9

This article is the same as in Example 8 except that the separation layers are composed of a woven cotton material having a bulk thickness of 0.076 cm, a bulk basis weight of 186 g/m$^2$, and a bulk density of 0.245 g/cm$^3$. Because this cotton material has about the same hydrophilicity as the material comprising the absorbent body, the separation layers can hold liquid close to the skin, and result in skin hydration values greater than that measured without the separation layers present.

Example 10

This article is the same as in Example 6, except that the breathable panel is comprised of a polyethylene microporous film such as PMP-1 from Mitsui Toatsu. This film material has a WVTR of approximately 4000 g/m$^2$/24 hours.

Example 11

This article is the same as in Example 6, except that there are breathable panels at both the front waistband section and back waistband section of the diaper.

Example 12

This diaper is the same as in Example 6, except that the entire backsheet is composed of a vapor permeable material, such as PMP-1 from Mitsui Toatsu, having a WVTR of approximately 4000 g/m$^2$/24 hours. The diaper can exhibit a cold and clammy feel when moisture is evaporating through the backsheet 20.

Example 13

This article is the same as in Example 6, except that it includes a humidity transfer region. This is accomplished by making the area of the absorbent body which is behind the breathable panel either less dense than the rest of the absorbent body or with apertures through the thickness of the absorbent.

Example 14

A diaper garment 200 representatively shown in Fig. 7 includes a backsheet layer 20, a topsheet layer 30, and an absorbent body 40 interposed between the backsheet and topsheet layers. Back sheet 20 includes a breathable panel 70 which is connected to provide an extension of the backsheet layer. Absorbent body 40 includes a humidity transfer region 44 which is connected to extend from a longitudinal end of the absorbent body. Optionally, one or more separation layers 50 may be located between absorbent body 40 and topsheet 30.

In the illustrated embodiment, absorbent body 40 is an absorbent composite comprising a surge control layer 202, a tissue layer 204, and a retention portion 206. Surge layer 202 is a fibrous material which quickly collects and temporarily holds rapid discharges of liquid, and transports the liquid from the initial entrance point to other parts of the absorbent body. The representatively shown embodiment of surge layer 202 is composed of a Hydrofil material having a basis weight of 200 g/m$^2$ and a bulk thickness of 0.218 cm (0.086 ") (at 1.38 kPa (0.2 psi)). The Hydrofil material is a macrofiber, meltblown nonwoven fibrous web available from Allied-Signal, a company having offices located in New York, New York. Alternatively, surge layer 202 may comprise a nonwoven web of polyethylene fibers having a web basis weight of 200 g/m$^2$ and a bulk thickness of 1.82 cm (0.72 ") (at 1.38 kPa (at 0.2 psi)).

The illustrated embodiment of retention portion 206 comprises 3 layers of a nonwoven coform web and particles of superabsorbent material. The superabsorbent material is composed of a polyacrylate hydrogel polymer and comprises 35 weight percent of the retention portion. The coform layers had a total basis weight of 900 g/m$^2$ and a total bulk thickness of 1.9 cm (0.75.") (at 1.38kPa(0.2 psi)). The coform material is composed of 50-63 weight percent wood pulp fluff and 2-15 weight percent of meltblown Hydrofil fibers or meltblown polypropylene fibers. High wet strength tissue 204 has a basis weight of 21 g/m$^2$ and a bulk thickness of 0.022 cm (0.009 ").

The front waistband of the absorbent body of the diaper includes a humidity transfer region 44 comprising a substantially hydrophobic, nonwettable, polyester fiberfill material, a material ordinarily employed for pillow batting. The fiberfill material has a basis weight of about 180 g/m$^2$ and a density of about 0.0417 g/cm$^3$ (at 1.38kPa (at 0.2 psi)). The humidity transfer region measures 2.54 cm (1") along the diaper length dimension and 11.25 cm (4.5") along the diaper cross-direction, thus covering an area of 28.57 cm$^2$ (4.5 in.$^2$ ).

A vapor permeable panel 70 placed over the humidity transfer region is a composite composed of an inner layer of calendered meltblown fibers and an outer layer of Guilford knit fabric. In the illustrated embodiment, the Guilford fabric is Guilford part 19903 loop material, which is a warp knit polyester fabric of two-bar construction. The fabric is composed of 40/13 polyester yarn (front bar) and 2.22 tex (20 denier) per filament monofilament (back bar) sprayed with Rohm & Haas AC-73 binder material. The knit fabric has a basis weight of 108.5 g/m$^2$ (3.2 oz.per sq. yard) and is available from Guilford Mills, a company having offices in Greensboro, North Carolina. The binder material is available from Rohm & Haas Company, a business having offices in Philadelphia, Pennsylvania.

## Example 15

A diaper garment was constructed with the structure described in Example 14. The diaper of this Example, however, included a topsheet composed of a layer of Guilford 19903 knit fabric, and included a separation layer composed of another layer of Guilford 19903 knit fabric placed adjacent the topsheet.

When compared to a standard control diaper, the diaper constructed in accordance with this Example exhibited a 43% decrease in skin hydration value.

## Example 16

A diaper garment was constructed with the structure described in Example 15. The diaper, however, was modified to include a humidity transfer region having the form of a 5.08 cm (2") diameter hole formed in the SAM/fluff (liquid retention material) of the absorbent body, as representatively shown in Fig. 8. The hole was positioned with the edge of the hole located about 2.54 cm (1") from the adjacent waistband edge of the absorbent body, and the removed liquid retention material was replaced with a polyester fiberfill material having a basis weight of about 180 g/m$^2$ basis weight and a bulk thickness of about 0.43 cm (about 0.17 ") as measured at 1.38 kPa (0.2 psi). When compared to a standard control diaper, the diaper of this Example exhibited a 27% decrease in skin hydration value.

## Example 17

A diaper garment is constructed with the structure described in Example 15. The diaper of this Example, however, was modified to include a humidity transfer region comprising a multilayer composite composed of a 200 g/m$^2$ layer of hydrofil surge material having a thickness of 0.218 cm (0.086") and 2 layers of 21 g/m$^2$ tissue material, as representatively shown in Fig. 9. When compared to a standard control diaper, the diaper constructed in accordance with this example exhibited a 41% decrease in skin hydration value.

## Example 18

A diaper garment was constructed with the structure described in Example 15. The diaper of this Example, however, was modified to include a humidity transfer region having the form of a generally rectangular notch formed in absorbent body 40. At the location of this notch, the humidity transfer region was composed of a 200 g/m$^2$ web of meltblown polyethylene fibers having a thickness of 0.18 cm 0.072") and 2 layers of 21 g/m$^2$ tissue material, as representatively shown in Fig. 10. The humidity transfer region had an area of 16.13 cm$^2$ (2.5 in.$^2$ ) When compared to a standard control diaper, the diaper of this example exhibited a 29% decrease in skin hydration value.

## Example 19

An absorbent composite was constructed with 2 layers of Guilford 19903 loop material. Each layer had a basis weight of 108g/m$^2$ and a bulk thickness of 0.06 cm (0.026") (at 1.38 kPa(0.2 psi)). The Guilford loop material provided the topsheet component of the absorbent composite. Overlying the layers of Guilford loop material was 2 layers of Hydrofil surge material. Each of these layers of surge material had a basis weight of 200g/m$^2$ and a bulk thickness of 0.218 cm (0.086") (at 1.38kPa (0.2psi)). Overlying the layers of surge material was a 21g/m$^2$ layer of tissue material. A layer region of retention material was located over the tissue material and formed the outermost portion of the absorbent composite. The retention material was composed of 3 layers of coform material containing 35 weight percent of superabsorbent particles. The coform material had a total basis weight of 900 g/m$^2$ and a total bulk thickness of 1.9 cm (0.75") (at 1.38kPa (0.2 psi)).

WVTR testing of samples of the absorbent composite material loaded with different amounts of synthetic urine produced the following data:

| Load (g/g) | WVTR (g/m$^2$ per 24 hr) |
|---|---|
| 0 | 3113 |
| 2 | 2792 |
| 3 | 2335 |
| 5 | 2274 |
| 6 | 1865 |
| 7 | 2037 |
| 8 | 1851 |
| 9 | 1737 |

The graph of Fig. 11 representatively shows the above data points correlated with a quadratic equation. From these data, it can be concluded that even a loading of 3 g -fluid/g -absorbent can reduce the WVTR of the absorbent composite to a level which may be insufficient to deliver a desired level of skin dryness. Preferably, the WVTR is at least about 3500 g/m$^2$ per 24 hr.

For the purposes of this Example, the WVTR test procedure is modified slightly to account for the liquid loaded into the absorbent composite: After filling the WVTR cup with 100 ml of distilled water and allowing it to equilibrate in the oven for one hour, the WVTR cup is weighed (without top/screws). Then, the screen and test sample are placed on the cup, and the top is screwed on. After loading the sample with synthetic urine and allowing it to equilibrate at room temperature for three minutes, the cup is placed in the oven per the ordinary procedure. Upon removal from the oven, the top, screen and sample are removed from the cup. The cup with remaining water is then weighed and the WVTR is determined.

## Example 20

Three samples of retention material were composed of fibrous coform material and superabsorbent particles. The retention material had a basis weight of about 900g/m$^2$, a thickness of about 1.9 cm (0.75")(at 1.38kPa (0.2psi))and contained approximately 35 wt% superabsorbent. The samples exhibited the following characteristics:

| Sample No. | Moisture Retention Index |
|---|---|
| 1 | 92.95 |
| 2 | 92.06 |
| 3 | 89.53 |

Example 21

Four samples were prepared with each sample comprising the retention material of Example 20, a layer of tissue on top of the retention material, a layer of Hydrofil surge material on top of the tissue and a layer of Guilford loop material (19903) on top of the surge material. The tissue had basis weight of about 21 g/m$^2$ and a thickness of about 0.022cm(about 0.009"). The surge material had a basis weight of about 200 g/m$^2$ and a thickness of about 0.218 cm (about 0.086") and the Guilford loop material had a basis weight of about 108 g/m$^2$ and a thickness of about 0.066 (about 0.026"). The samples of this Example exhibited the following characteristics:

| Sample No. | Moisture Retention Index | Wicking Index |
|---|---|---|
| 1 | 85.97 | 0.43 |
| 2 | 91.37 | 0.41 |
| 3 | 89.68 | 0.41 |
| 4 | 95.20 | ---- |

Example 22

Four samples were prepared with each sample comprising a layer of tissue, a layer of Hydrofil surge material on top of the tissue and a layer of Guilford loop material (19903) on top of the surge material. The tissue had basis weight of about 21 g/m$^2$ and a thickness of about 0.022 cm (about 0.009"). The surge material had a basis weight of about 200 g/m$^2$ and a thickness of about 0.218 cm (about 0.086"), and the Guilford loop material had a basis weight of about 108 g/m$^2$ and a thickness of about 0.066 cm (about 0.026"). The samples of this Example exhibited the following characteristics:

| Sample No. | Moisture Retention Index | Wicking Index |
|---|---|---|
| 1 | 16.28 | 0.03 |
| 2 | 20.00 | 0.03 |
| 3 | 17.32* | 0.03 |
| 4 | 17.48 | ---- |

[*27 min reading]

Example 23

Four samples were prepared with each sample comprising a layer of tissue, a layer of polyester fiberfill material on top of the tissue and a layer of Guilford loop material (19903) on top of the surge material. The tissue had basis weight of about 21 g/m$^2$ and a thickness of about 0.022 cm (about 0.009"). The fiberfill material had a basis weight of about 180 g/m$^2$ and a thickness of about 0.43cm (about 0.17"), and the Guilford loop material had a basis weight of about 108 g/m$^2$ and a thickness of about 0.066 cm (about 0.026"). The samples of this Example exhibited the following characteristics:

| Sample No. | Moisture Retention Index | Wicking Index |
|---|---|---|
| 1 | 11.58 | 0.02 |
| 2 | 17.17 | 0.02 |
| 3 | 12.35 | 0.01 |
| 4 | 13.68 | ---- |

## Claims

1. An absorbent article (10), which generally delimits a front waistband section (12), a rear waistband section (14) and an intermediate section (16) which interconnects said front and rear waistband sections, the article comprising:
   a substantially vapor impermeable backsheet layer (20);
   a liquid permeable topsheet layer (30) positioned in facing relation with said backsheet layer (20);
   an absorbent body (40) for storing absorbed liquid, said absorbent body located between said backsheet layer (20) and topsheet layer (30) and including an absorbent material which provides for a level of moisture retention therein for storing absorbed liquid, said absorbent body (40)
   characterized by
   having a humidity transfer zone portion (44) wherein said humidity transfer zone portion (44) exhibits a relatively lower level of moisture retention as compared to other areas of said absorbent body (40) where said liquid is normally stored; and
   said absorbent article further characterized by
   a vapor permeable panel (70) which is substantially liquid impermeable and is connected to said backsheet layer(20) in at least one waistband section of said article, said vapor permeable panel (70) arranged in an overlying registry with at least a portion of said humidity transfer zone (44).

2. An absorbent article as recited in claim 1, wherein said humidity transfer zone (44) has a moisture retention index of not more than 40 g.

3. An absorbent article as recited in claim 1, wherein said vapor permeable panel is sufficiently liquid impermeable to support a hydrohead of 70 cm for 5 sec. with a visible leakage therethrough of no more than 0.05 ml of water.

4. An absorbent article as recited in one of the preceding claims, wherein said vapor permeable panel (70) is composed of a material having a water vapor transmission rate (WVTR) value of at least 2000 $g/m^2/24$ hr., preferably of at least 4000 $g/m^2/24$ hr. and most preferably of at least 5000 $g/m^2/24$ hr.

5. An absorbent article as recited in one of the preceding claims, further comprising one or more separation layers (50,52,54) located between said topsheet layer (30) and said absorbent body(40).

6. An absorbent article as recited in claim 5, wherein said separation layers (50,52,54) and said topsheet layer (30) have a total combined bulk thickness (at 0.207 kPa) of at least 0.078 cm preferably of within the range of 0.1 - 0.6 cm.

7. An absorbent article (10) according to claim 1, comprising:
   one or more separation layers (50,52,54) located between said topsheet layer (30) and said absorbent body (40), said separation layers (50,52,54) providing for effective fluid transfer between said topsheet layer (30) and said absorbent body (40) and forming spacing means composed of substantially hydrophobic material and having a total bulk thickness within a range of 0.07 - 0.51 cm (at 0.207 kPa); and
   wherein said vapor permeable panel (70) extends over an area within the range of 5-400 $cm^2$.

8. An absorbent article as recited in one of the preceding claims wherein said vapor permeable panel (70) is formed in a front waistband section and/or a rear waistband section of said backsheet layer (20).

9. An absorbent article as recited in one of preceding claims wherein said vapor permeable panel (70) comprises a calendered, meltblown, nonwoven fibrous web.

10. An absorbent article as recited in one of the preceding claims wherein said humidity transfer region (44) comprises a mass of hydrophobic fibers, preferably a mass of polyester fibers.

11. An absorbent article as recited in one of the preceding claims, wherein said humidity transfer region (44) has a Moisture Retention Index of not more than 30 g and preferably of not more than 20 g.

**12.** An absorbent article as recited in one of the preceding claims, wherein said humidity transfer region (44) has a Wicking Index of not more than 0.2 g, preferably not more than 0.1 g, and most preferably not more than 0.05 g.

**13.** An absorbent article as recited in one of the preceding claims, wherein said humidity transfer region (44) comprises a composite, preferably a multi-layer composite.

**14.** An absorbent article as recited in one of the preceding claims, wherein said humidity transfer region (44) comprises a fibrous web having a density within the range of 0.001 - 0.05 kg/cm$^3$ and a basis weight within the range of 5 - 300 g/m$^2$.

**15.** An absorbent article as recited in one of the preceding claims, wherein said vapor permeable panel (70) is constructed of a material which provides a Test Relative Humidity (TRH) value of not more than 80%, preferably of not more than 75%.

**16.** An absorbent article as recited in one of the preceding claims, further comprising spacing means (50,52,54) located between said topsheet layer (30), and said absorbent body (40), said spacing means providing for effective fluid transfer between said topsheet layer and said absorbent body, said spacing means composed of substantially hydrophobic material, and said spacing means and topsheet layer having a total bulk thickness of at least 0.078 cm.

**17.** An absorbent article as recited in claim 16, wherein said spacing means comprises one or more separation layers (50,52,54) composed of fibrous material having a combined bulk thickness of at least 0.04 cm.

**18.** An absorbent article as recited in one of claims 5 to 17, wherein one or more of said separation layers (50,52,54) is composed of a knit fabric.

**19.** An absorbent article as recited in one of the preceding claims, wherein said vapor permeable panel (70) extends over a vapor permeability area totalling at least 5 cm$^2$.

**20.** An absorbent article as recited in one of the preceding claims wherein said vapor permeable panel (70) material extends along 10 - 40% of the length of said absorbent body.

**21.** An absorbent article as recited in one of the preceding claims, wherein said absorbent body (40) includes a humidity transfer portion (44) which has a composite basis weight of not more than 550 g/m$^2$ located in adjacent facing relation with said vapor permeable panel (70).

**22.** An absorbent article as recited in one of the preceding claims, wherein said humidity transfer region (44) of the absorbent body (40) has a density of not more than 0.1 g/cm$^3$.

**23.** An absorbent article as recited in one of the preceding claims wherein the humidity transfer region (44) located in operable registration with said vapor permeable panel (70) and has an average basis weight within the range of 5 - 300 g/m$^2$ and/or an average density within the range of 0.001 - 0.05 g/cm$^3$ and/or a bulk thickness of at least 0.51 cm (about 0.02 inches).

**24.** An absorbent article (10) according to claim 1, comprising:
one or more liquid permeable separation layers (50,52,54) located between said topsheet layer (30) and said absorbent body (40), said separation layers (50,52,54) allowing fluid transfer between said topsheet layer (30) and said absorbent body (40), said separation layers (50,52,54) composed of substantially hydrophobic material, and said separation layers and top sheet layer having a total bulk thickness of at least 0.078 cm (at 0.207 kPa)

**25.** An absorbent article as recited in claim 24, wherein said vapor permeable panel (70) is composed of a material having a water vapor transmission rate (WVTR) value of at least 2000 g/m$^2$/24 hr., more preferably of at least 4000 g/m$^2$/24 hr., and most preferably at least 5000 g/m$^2$/24 hr.

**26.** An absorbent article as recited in claims 24 or 25, wherein said separation layers (50,52,54) have a total combined bulk thickness of at least 0.04 cm (at 0.207 kPa).

**27.** An absorbent article as recited in one of claims 24 to 26, wherein said separation layers (50,52,54) and said topsheet layer have a total combined bulk thickness of at least 0.078 cm (at 0.207 kPa) or preferably within the range of 0.1 - 0.6 cm.

**28.** An absorbent article as recited in one of claims 24 to 27 wherein said vapor permeable panel (70) extends over a vapor permeability area totalling at least 5 $cm^2$.

**29.** An absorbent article as recited in one of claims 24 to 28, wherein said vapor permeable panel (70) is formed in a front waistband section (12) and/or a rear waistband section (14) of said backsheet layer.

**30.** An absorbent article as recited in one of claims 24 to 29 wherein said vapor permeable panel (70) is composed of a calendered, meltblown, nonwoven fibrous web.

**31.** An absorbent article as recited in one of claims 24 to 30 wherein said separation layers (50,52,54) comprise 1 - 5 layers of nonwoven fibrous web material.

**32.** An absorbent article as recited in claim 31 wherein said separation layers (50,52,54) are layers of spunbond fibrous web material composed of polyolefin fibers.

**33.** An absorbent article as recited in claim 32, wherein each of said spunbond fibrous webs have a total basis weight of at least 34 $g/m^2$.

**34.** An absorbent article as recited in claim 32 wherein one or more of said spunbond fibrous web layers is composed of polypropylene fibers and has a basis weight within the range of 55 - 170 $g/m^2$ and a bulk density of 0.03 - 0.5 $g/cm^3$ (at 0.207 kPa).

**35.** An absorbent article as recited in claim 34, wherein said polypropylene fibers have a denier within the range of 1.5 - 6d.

**36.** An absorbent article as recited in one of claims 24 to 35 wherein said absorbent body (40) has a plurality of apertures (43) through the thickness thereof and wherein at least a portion of said apertures are in operable registration with permeable panel (70).

**37.** An absorbent article as recited in one of claims 24 to 36 wherein said absorbent body (40) has a humidity transfer region (44) which is in operable registration with said vapor permeable panel (70), said humidity transfer region (44) having a density within the range of 0.001 - 0.05 $g/cm^3$ and a basis weight within the range of 5 - 300 $g/m^2$.

**38.** An absorbent article as recited in one of claims 24 to 37 wherein said vapor permeable panel (70) is constructed of a material which provides a Test Relative Humidity (TRH) value of not more than 80%, preferably not more than 75%.

**39.** An absorbent article as recited in one of claims 24 to 38 wherein said separation layers (52,54,56) are limited to a front two-thirds section of said absorbent article (10).

**40.** An absorbent article as recited in one of claims 24 to 38 wherein said separation layers (50,52,54) are limited to a middle 35 - 60% section of said absorbent article.

**41.** An absorbent article as recited in one of claims 24 to 40 wherein said article comprises a plurality of individual separation layers (50,52,54) two or more of which are connected together at selected spaced locations (46).

**42.** An absorbent article as recited in claim 41 wherein said separation layers (50,52,54) are connected together at discrete locations arranged in a selected pattern.

**43.** An absorbent article (10) according to claim 1 comprising:
spacing means (50,52,54) located between said topsheet layer and said absorbent body (40) said spacing means providing for effective fluid transfer between said topsheet layer and said absorbent body, and said spacing means composed of substantially hydrophobic material and having a total bulk thickness of at least 0.04 cm.

**44.** An absorbent article as recited in claim 43 wherein said vapor permeable panel (70) is composed of a material which has a water vapor transmission rate (WVTR) of at least 2000 $g/m^2/24$ hr, and/or extends over an area within the range of 5 - 400 $cm^2$.

**45.** An absorbent article as recited in claim 43 or 44 wherein said vapor permeable panel (70) material extends along 10 - 40% of the length of said absorbent body beginning from a front waistband, terminal edge of said absorbent body (40).

**46.** An absorbent article as recited in one of claims 43 to 45 wherein said absorbent body (40) has a humidity transfer portion (44) which is located in adjacent facing relation with said vapor permeable panel (70) and has a basis weight of not more than 550 $g/m^2$ and/or a density of not more than 0.1 $g/cm^3$.

**47.** An absorbent article (10) according to claim 1 comprising:
a vapor permeable panel (70) connected to said backsheet layer (20) in at least one waistband section (12,14) of said article, said vapor permeable panel (70) composed of a material which is substantially liquid impermeable and has a water vapor transmission rate (WVTR) of at least 2000 $g/m^2/24$ hr and which extends over a panel area of at least 22 $cm^2$,
and an absorbent body (40) located between said backsheet layer (20) and topsheet layer (30) and arranged with a portion of said absorbent body (40) in an underlying facing registry with said vapor permeable panel (70).

**48.** An absorbent article as recited in claim 47, wherein said vapor permeable panel extends over an area of at least 45 $cm^2$.

**49.** An absorbent article as recited in claim 47 or 48 wherein said absorbent body (40) includes a humidity transfer region (44) which region is located in operable registration with said vapor permeable panel (70) and has an average basis weight within the range of 5 - 300 $gm^2$.

**50.** An absorbent article as recited in one of claims 47 to 49, wherein said humidity transfer region (44) has an average density within the range of 0.001 - 0.05 $g/cm^3$.

**51.** An absorbent article (10) according to claim 1 comprising:
a vapor permeable panel (70) which is substantially liquid impermeable and is connected to said backsheet layer (20) in at least one waistband section (12,14) of said article, said vapor permeable panel (70) composed of a material having a water vapor transmission rate (WVTR) of at least 2000 $g/m^2/24$ hr. and extending over an area of at least about 22 $cm^2$; and
an absorbent body (40) located between said backsheet layer (20) and topsheet layer (30) and having a humidity transfer region (44) located in operable facing registration with said vapor permeable panel, said humidity transfer region having one or more apertures (43) formed therethrough to provide for a Frazier air porosity value of at least 15.25 $m^3/min/m^2$.

**52.** An absorbent article as recited in claim 51 wherein said apertured, humidity transfer region (44) provides for a Frazier air porosity value within the range of 15.25 - 30 $m^3/min/m^2$.

**53.** An absorbent article as recited in claim 51 or 52 wherein said apertures (43) are substantially circular and have an average diameter within the range of 0.5 - 2.0 cm.

**54.** An absorbent article as recited in any preceding claims, wherein said humidity transfer zone portion (44) comprises a substantially hydrophobic, nonwettable fibrous material which has a basis weight within the range of about 5-300 $g/m^2$ and a density of not more than about 0.1 $gm/c^3$. said nonwettable fibrous material configured to limit a presence and wicking therein of liquid and to limit an occluding of

said nonwettable fibrous material by liquid.

55. An absorbent article as recited in any preceding claim, wherein said humidity transfer zone portion (44) comprises a substantially hydrophobic, nonwettable fibrous material having a basis weight within the range of 5-300 g/m$^2$ located in one or more apertures which are entirely spaced from longitudinally opposed waistband edges of said absorbent body (40) and are formed through the thickness dimension of said absorbent body (40), said nonwettable fibrous material configured to limit a presence and wicking therein of liquid and to limit an occluding of said nonwettable fibrous material by liquid.

56. An absorbent article as recited in any preceding claim, wherein said humidity transfer zone portion (44) comprises a substantially hydrophobic, nonwettable fibrous material which has a basis weight within the range of 5-300 g/m$^2$ and is configured to span across an entire waistband edge of said absorbent body (40), said nonwettable fibrous material configured to limit a presence and wicking therein of liquid and to limit an occluding of said nonwettable fibrous material by liquid.

## Patentansprüche

1. Saugfähiger Artikel (10), welcher im allgemeinen durch einen vorderen Taillenbundabschnitt (12), einen hinteren Taillenbundabschnitt (14) und einen Zwischenabschnitt (16), welcher den vorderen Taillenbundabschnitt mit dem hinteren verbindet, abgegrenzt ist, wobei der Artikel umfaßt:
   eine im wesentlichen dampfundurchlässige Rückschicht (20);
   eine flüssigkeitsdurchlässige obere Schicht (30), welche gegenüberliegend zu der Rückschicht (20) angeordnet ist;
   einen Saugkörper (40) zum Speichern absorbierter Flüssigkeit, wobei der Saugkörper sich zwischen der Rückschicht (20) und der oberen Schicht (30) befindet und ein saugfähiges Material aufweist, welches darin einen Grad an Feuchtigkeitsrückhaltevermögen zum Speichern absorbierter Flüssigkeit gewährleistet, wobei der Saugkörper (40)
   dadurch gekennzeichnet ist, daß
   dieser einen Feuchtigkeitsübertragungszonenbereich (44) aufweist, wobei der Feuchtigkeitsübertragungszonenbereich (44) einen relativ gesehen geringeren Grad an Feuchtigkeitsrückhaltevermögen im Vergleich zu anderen Bereichen des Saugkörpers (40) aufweist, wo die Flüssigkeit normalerweise gespeichert ist; und
   wobei der saugfähige Artikel des weiteren gekennzeichnet ist durch
   eine dampfdurchlässige Bahn (70), welche im wesentlichen flüssigkeitsundurchlässig ist und in mindestens einem Taillenbundabschnitt des Artikels mit der Rückschicht (20) verbunden ist, wobei die dampfdurchlässige Bahn (70) darüberliegend in Deckung mit mindestens einem Bereich der Feuchtigkeitsübertragungszone (44) angeordnet ist.

2. Saugfähiger Artikel gemäß Anspruch 1, bei dem die Feuchtigkeitsübertragungszone (44) einen Feuchtigkeitsrückhaltevermögensindex von nicht mehr als 40 g aufweist.

3. Saugfähiger Artikel gemäß Anspruch 1, bei dem die dampfdurchlässige Bahn ausreichend flüssigkeitsundurchlässig ist, um einem Wasserkörper von 70 cm 5 Sekunden lang mit einem sichtbaren Durchsickern von nicht mehr als 0,05 ml Wasser standzuhalten.

4. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem die dampfdurchlässige Bahn (70) ein Material mit einem Wert des Wasserdampfdurchlässigkeitsgrads (WVTR) von mindestens 2000 g/m$^2$/24 Std., vorzugsweise von mindestens 4000 g/m$^2$/24 Std. und am bevorzugtesten von mindestens 5000 g/m$^2$/24 Std. aufweist.

5. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, der des weiteren eine oder mehrere Trennschichten (50, 52, 54) aufweist, welche sich zwischen der oberen Schicht (30) und dem Saugkörper (40) befinden.

6. Saugfähiger Artikel gemäß Anspruch 5, bei dem die Trennschichten (50, 52, 54) und die obere Schicht (30) insgesamt eine Verbundbauschdichte (bei 0,207 kPa) aufweisen, welche mindestens 0,078 cm beträgt und vorzugsweise im Bereich von 0,1 - 0,6 cm liegt.

7. Saugfähiger Artikel (10) gemäß Anspruch 1, der umfaßt:
eine oder mehrere Trennschichten (50, 52, 54), welche sich zwischen der oberen Schicht (30) und dem Saugkörper (40) befinden, wobei die Trennschichten (50, 52, 54) eine effektive Flüssigkeitsübertragung zwischen der oberen Schicht (30) und dem Saugkörper (40) gewährleisten und Abstandsmittel bilden, welche ein im wesentlichen hydrophobes Material umfassen, und insgesamt eine Bauschdichte in einem Bereich von 0,07 - 0,51 cm (bei 0,207 kPa) aufweisen; und
wobei sich die dampfdurchlässige Bahn (70) über eine Fläche im Bereich von 5 - 400 cm$^2$ erstreckt.

8. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem die dampfdurchlässige Bahn (70) in einem vorderen Taillenbundabschnitt und/oder einem hinteren Taillenbundabschnitt der Rückschicht (20) ausgebildet ist.

9. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem die dampfdurchlässige Bahn (70) eine kalandrierte, schmelzgeblasene Faservliesbahn aufweist.

10. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem der Feuchtigkeitsübertragungsbereich (44) eine Masse hydrophober Fasern, vorzugsweise eine Masse Polyesterfasern, aufweist.

11. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem der Feuchtigkeitsübertragungsbereich (44) einen Feuchtigkeitsrückhaltevermögensindex von nicht mehr als 30 g und vorzugsweise von nicht mehr als 20 g aufweist.

12. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem der Feuchtigkeitsübertragungsbereich (44) einen Dochtwirkungsindex von nicht mehr als 0,2 g, vorzugsweise nicht mehr als 0,1 g und am bevorzugtesten nicht mehr als 0,05 g aufweist.

13. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem der Feuchtigkeitsübertragungsbereich (44) einen Verbundstoff, vorzugsweise einen Mehrschichtverbundstoff, aufweist.

14. Saugfähiger Artikel qemäß einem der vorhergehenden Ansprüche, bei dem der Feuchtigkeitsübertragungsbereich (44) eine Faserbahn mit einer Dichte im Bereich von 0,001 - 0,05 kg/cm$^3$ und einem Flächengewicht im Bereich von 5 - 300 g/m$^2$ aufweist.

15. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem die dampfdurchlässige Bahn (70) aus einem Material hergestellt ist, welches einen Testwert relativer Feuchtigkeit (TRH) von nicht mehr als 80%, vorzugsweise von nicht mehr als 75%, gewährleistet.

16. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, der des weiteren Abstandsmittel (50, 52, 54) aufweist, welche sich zwischen der oberen Schicht (30) und dem Saugkörper (40) befinden, wobei die Abstandsmittel eine effektive Flüssigkeitsübertragung zwischen der oberen Schicht und dem Saugkörper gewährleisten, wobei die Abstandsmittel ein im wesentlichen hydrophobes Material umfassen, wobei die Abstandsmittel und die obere Schicht insgesamt eine Bauschdichte von mindestens 0,078 cm aufweisen.

17. Saugfähiger Artikel gemäß Anspruch 16, bei dem das Abstandsmittel eine oder mehrere Trennschichten (50, 52, 54) aus Fasermaterial mit einer Verbundbauschdichte von mindestens 0,04 cm aufweisen.

18. Saugfähiger Artikel gemäß einem der Ansprüche 5 bis 17, bei dem eine oder mehrere der Trennschichten (50, 52, 54) einen Wirkstoff aufweisen.

19. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem sich die dampfdurchlässige Bahn (70) über eine Dampfdurchlässigkeitsfläche von insgesamt mindestens 5 cm$^2$ erstreckt.

20. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem sich das Material der dampfdurchlässigen Bahn (70) entlang 10 - 40% der Länge des Saugkörpers erstreckt.

21. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem der Saugkörper (40) einen Feuchtigkeitsübertragungsbereich (44) mit einem Verbundflächengewicht von nicht mehr als 550 g/m², welcher der dampfdurchlässigen Bahn (70) benachbart gegenüberliegt, umfaßt.

22. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem der Feuchtigkeitsübertragungsbereich (44) des Saugkörpers (40) eine Dichte von nicht mehr als 0,1 g/cm³ aufweist.

23. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem der Feuchtigkeitsübertragungsbereich (44) in operabler Deckung mit der dampfdurchlässigen Bahn (70) angeordnet ist und ein durchschnittliches Flächengewicht im Bereich von 5 - 300 g/m² und/oder eine durchschnittliche Dichte im Bereich von 0,001 - 0,05 g/cm³ und/oder eine Bauschdichte von mindestens 0,51 cm (etwa 0,02 Inch) aufweist.

24. Saugfähiger Artikel (10) gemäß Anspruch 1 mit:
einer oder mehreren flüssigkeitsdurchlässigen Trennschichten (50, 52, 54), welche sich zwischen der oberen Schicht (30) und dem Saugkörper (40) befinden, wobei die Trennschichten (50, 52, 54) eine Fluidübertragung zwischen der oberen Schicht (30) und dem Saugkörper (40) ermöglichen, wobei die Trennschichten (50, 52, 54) ein im wesentlichen hydrophobes Material aufweisen und die Trennschichten und die obere Schicht insgesamt eine Bauschdichte von mindestens 0,078 cm (bei 0,207 kPa) aufweisen.

25. Saugfähiger Artikel gemäß Anspruch 24, bei dem die dampfdurchlässige Bahn (70) ein Material mit einem Wert des Wasserdampfdurchlässigkeitsgrads (WVTR) von mindestens 2000 g/m²/24 Std., bevorzugter von mindestens 4000 g/m²/24 Std. und am bevorzugtesten von mindestens 5000 g/m²/24 Std. aufweist.

26. Saugfähiger Artikel gemäß einem der Ansprüche 24 oder 25, bei dem die Trennschichten (50, 52, 54) insgesamt eine Verbundbauschdichte von mindestens 0,04 cm (bei 0,207 kPa) aufweisen.

27. Saugfähiger Artikel gemäß einem der Ansprüche 24 bis 26, bei dem die Trennschichten (50, 52, 54) und die obere Schicht insgesamt eine Verbundbauschdichte aufweisen, welche mindestens 0,078 cm (bei 0,207 kPa) beträgt oder vorzugsweise im Bereich von 0,1 - 0,6 cm liegt.

28. Saugfähiger Artikel gemäß einem der Ansprüche 24 bis 27, bei dem sich die dampfdurchlässige Bahn (70) über eine Dampfdurchlässigkeitsfläche von insgesamt mindestens 5 cm² erstreckt.

29. Saugfähiger Artikel gemäß einem der Ansprüche 24 bis 28, bei dem die dampfdurchlässige Bahn (70) in einem vorderen Taillenbundabschnitt (12) und/oder einem hinteren Taillenbundabschnitt (14) der Rückschicht ausgebildet ist.

30. Saugfähiger Artikel gemäß einem der Ansprüche 24 bis 29, bei dem die dampfdurchlässige Bahn (70) eine kalandrierte, schmelzgeblasene Faservliesbahn aufweist.

31. Saugfähiger Artikel gemäß einem der Ansprüche 24 bis 30, bei dem die Trennschichten (50, 52, 54) 1 - 5 Schichten Faservliesbahnmaterial aufweisen.

32. Saugfähiger Artikel gemäß Anspruch 31, bei dem die Trennschichten (50, 52, 54) Schichten aus spinngebundenem, Polyolefinfasern umfassendem Faserbahnmaterial sind.

33. Saugfähiger Artikel gemäß Anspruch 32, bei dem jede der spinngebundenen Faserbahnen insgesamt ein Flächengewicht von mindestens 34 g/m² aufweist.

34. Saugfähiger Artikel gemäß Anspruch 32, bei dem eine oder mehrere der spinngebundenen Faserbahnschichten Polypropylenfasern umfaßt und ein Flächengewicht im Bereich von 55 - 170 g/m² und eine Bauschdichte von 0,03 - 0,5 g/cm³ (bei 0,207 kPa) aufweist.

35. Saugfähiger Artikel gemäß Anspruch 34, bei dem die Polypropylenfasern einen Denier-Wert im Bereich von 1,5 - 6d aufweisen.

36. Saugfähiger Artikel gemäß einem der Ansprüche 24 bis 35, bei dem der Saugkörper (40) durch dessen Dicke eine Mehrzahl von Öffnungen (43) aufweist, und bei dem mindestens ein Bereich der Öffnungen in operabler Deckung mit der durchlässigen Bahn (70) ist.

37. Saugfähiger Artikel gemäß einem der Ansprüche 24 bis 36, bei dem der Saugkörper (40) einen Feuchtigkeitsübertragungsbereich (44) aufweist, welcher mit der dampfdurchlässigen Bahn (70) in operabler Deckung ist, wobei der Feuchtigkeitsübertragungsbereich (44) eine Dichte im Bereich von 0,001 - 0,05 g/cm$^3$ und ein Flächengewicht im Bereich von 5 - 300 g/m$^2$ aufweist.

38. Saugfähiger Artikel gemäß einem der Ansprüche 24 bis 37, bei dem die dampfdurchlässige Bahn (70) aus einem Material hergestellt ist, welches einen Testwert relativer Feuchtigkeit (TRH) von nicht mehr als 80%, vorzugsweise nicht mehr als 75%, gewährleistet.

39. Saugfähiger Artikel gemäß einem der Ansprüche 24 bis 38, bei dem die Trennschichten (50, 52, 54) auf einen vorderen Abschnitt von zwei Dritteln des saugfähigen Artikels (10) begrenzt sind.

40. Saugfähiger Artikel gemäß einem der Ansprüche 24 bis 38, bei dem die Trennschichten (50, 52, 54) auf einen mittleren Abschnitt von 35 - 60% des saugfähigen Artikels begrenzt sind.

41. Saugfähiger Artikel gemäß einem der Ansprüche 24 bis 40, bei dem der Artikel eine Mehrzahl einzelner Trennschichten (50, 52, 54) aufweist, von denen zwei oder mehrere an ausgewählten beabstandeten Stellen (46) miteinander verbunden sind.

42. Saugfähiger Artikel gemäß Anspruch 41, bei dem die Trennschichten (50, 52, 54) an einzelnen, in einem ausgewählten Muster angeordneten Stellen miteinander verbunden sind.

43. Saugfähiger Artikel (10) gemäß Anspruch 1 mit:
Abstandsmitteln (50, 52, 54), welche sich zwischen der oberen Schicht und dem Saugkörper (40) befinden, wobei die Abstandsmittel eine effektive Fluidübertragung zwischen der oberen Schicht und dem Saugkörper gewährleisten, und wobei die Abstandsmittel ein im wesentlichen hydrophobes Material umfassen und insgesamt eine Bauschdichte von mindestens 0,04 cm aufweisen.

44. Saugfähiger Artikel gemäß Anspruch 43, bei dem die dampfdurchlässige Bahn (70) ein Material umfaßt, welches einen Wasserdampfdurchlässigkeitsgrad (WVTR) von mindestens 2000 g/m$^2$/24 Std. aufweist, und/oder sich über eine Fläche im Bereich von 5 - 400 cm$^2$ erstreckt.

45. Saugfähiger Artikel gemäß einem der Ansprüche 43 oder 44, bei dem sich das Material der dampfdurchlässigen Bahn (70) entlang 10 - 40% der Länge des Saugkörpers ausgehend von einer Endkante am vorderen Taillenbund des Saugkörpers (40) erstreckt.

46. Saugfähiger Artikel gemäß einem der Ansprüche 43 bis 45, bei dem der Saugkörper (40) einen Feuchtigkeitsübertragungsbereich (44) aufweist, welcher der dampfdurchlässigen Bahn (70) benachbart gegenüberliegt und ein Flächengewicht von nicht mehr als 550 g/m$^2$ und/oder eine Dichte von nicht mehr als 0,1 g/cm$^3$ aufweist.

47. Saugfähiger Artikel (10) gemäß Anspruch 1 mit:
einer dampfdurchlässigen Bahn (70), welche mit der Rückschicht (20) in mindestens einem Taillenbundabschnitt (12, 14) des Artikels verbunden ist, wobei die dampfdurchlässige Bahn (70) ein Material aufweist, welches im wesentlichen flüssigkeitsundurchlässig ist und einen Wasserdampfdurchlässigkeitsgrad (WVTR) von mindestens 2000 g/m$^2$/24 Std. aufweist und sich über einen Bahnbereich von mindestens 22 cm$^2$ erstreckt,
und einem Saugkörper (40), welcher sich zwischen der Rückschicht (20) und der oberen Schicht (30) befindet und mit einem Bereich des Saugkörpers (40) darunterliegend in Deckung mit der dampfdurchlässigen Bahn (70) angeordnet ist.

48. Saugfähiger Artikel gemäß Anspruch 47, bei dem sich die dampfdurchlässige Bahn über einen Bereich von mindestens 45 cm$^2$ erstreckt.

49. Saugfähiger Artikel gemäß Anspruch 47 oder 48, bei dem der Saugkörper (40) einen Feuchtigkeitsübertragungsbereich (44) aufw ist, wobei sich der Bereich in operabler Deckung mit der dampfdurchlässigen Bahn (70) befindet und ein durchschnittliches Flächengewicht im Bereich von 5 - 300 g/m$^2$ aufweist.

50. Saugfähiger Artikel gemäß einem der Ansprüche 47 bis 49, bei dem der Feuchtigkeitsübertragungsbereich (44) eine durchschnittliche Dichte im Bereich von 0,001 - 0,05 g/cm$^3$ aufweist.

51. Saugfähiger Artikel (10) gemäß Anspruch 1, mit:
einer dampfdurchlässigen Bahn (70), welche im wesentlichen flüssigkeitsundurchlässig ist und mit der Rückschicht (20) in mindestens einem Taillenbundabschnitt (12, 14) des Artikels verbunden ist, wobei die dampfdurchlässige Bahn (70) ein Material umfaßt, welches einen Wasserdampfdurchlässigkeitsgrad (WVTR) von mindestens 2000 g/m$^2$/24 Std. aufweist und sich über einen Bereich von mindestens etwa 22 cm$^2$ erstreckt; und
einem Saugkörper (40), welcher sich zwischen der Rückschicht (20) und der oberen Schicht (30) befindet und einen Feuchtigkeitsübertragungsbereich (44) aufweist, welcher sich in operabler gegenüberliegender Deckung mit der dampfdurchlässigen Bahn befindet, wobei der Feuchtigkeitsübertragungsbereich eine oder mehrere dadurch hindurchgehende Öffungen (43) aufweist, um einen Luftdurchlässigkeitswert nach Frazier von mindestens 15,25 m$^3$/Min./m$^2$ zu gewährleisten.

52. Saugfähiger Artikel gemäß Anspruch 51, bei dem der mit Öffnungen versehene Feuchtigkeitsübertragungsbereich (44) einen Luftdurchlässigkeitswert nach Frazier im Bereich von 15,25 - 30 m$^3$/Min./m$^2$ gewährleistet.

53. Saugfähiger Artikel gemäß Anspruch 51 oder 52, bei dem die Öffnungen (43) im wesentlichen rund sind und einen durchschnittlichen Durchmesser im Bereich von 0,5 - 2,0 cm aufweisen.

54. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem der Feuchtigkeitsübertragungszonenbereich (44) ein im wesentlichen hydrophobes, nicht benetzbares Fasermaterial mit einem Flächengewicht im Bereich von etwa 5 - 300 g/m$^2$ und einer Dichte von nicht mehr als 0,1 g/cm$^3$ umfaßt, wobei das nicht benetzbare Fasermaterial so ausgebildet ist, daß dieses ein Vorhandensein und eine Dochtwirkung von Flüssigkeit darin begrenzt sowie ein Okkludieren des nicht benetzbaren Fasermaterials durch Flüssigkeit begrenzt.

55. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem der Feuchtigkeitsübertragungsbereich (44) ein im wesentlichen hydrophobes, nicht benetzbares Fasermaterial mit einem Flächengewicht im Bereich von 5 - 300 g/m$^2$ aufweist, das sich in einer oder mehreren Öffnungen befindet, welche von sich längs gegenüberliegenden Taillenbundkanten des Saugkörpers (40) ganz beabstandet sind und durch die Dimension der Dicke des Saugkörpers (40) gebildet sind, wobei das nicht benetzbare Fasermaterial so ausgebildet ist, daß dieses ein Vorhandensein und eine Dochtwirkung von Flüssigkeit darin begrenzt sowie ein Okkludieren des nicht benetzbaren Fasermaterials durch Flüssigkeit begrenzt.

56. Saugfähiger Artikel gemäß einem der vorhergehenden Ansprüche, bei dem der Feuchtigkeitsübertragungszonenbereich (44) ein im wesentlichen hydrophobes, nicht benetzbares Fasermaterial mit einem Flächengewicht im Bereich von 5 - 300 g/m$^2$ umfaßt, das so ausgebildet ist, daß es sich über eine ganze Taillenbundkante des Saugkörpers (40) erstreckt, wobei das nicht benetzbare Fasermaterial so ausgebildet ist, daß dieses ein Vorhandensein und eine Dochtwirkung von Flüssigkeit darin begrenzt sowie ein Okkludieren des nicht benetzbaren Fasermaterials durch Flüssigkeit begrenzt.

## Revendications

1. Article absorbant (10) qui délimite généralement une portion de ceinture avant (12), une portion de ceinture arrière (14) et une portion intermédiaire (16) qui interconnecte lesdites portions de ceinture avant et arrière, l'article comprenant :
   une couche de feuille support (20) sensiblement imperméable à la vapeur ;
   une couche de feuille supérieure (30) perméable aux liquides et positionnée en relation de vis-à-vis avec ladite couche de feuille support (20) ;

un corps absorbant (40) pour stocker le liquide absorbé, ledit corps absorbant étant situé entre ladite couche de feuille support (20) et ladite couche de feuille supérieure (30) et comprenant un matériau absorbant qui lui confère une capacité de rétention de l'humidité pour stocker un liquide absorbé, ledit corps absorbant (40) étant caractérisé en ce qu'il possède une zone de transfert de l'humidité (44), ladite zone de transfert de l'humidité (44) présentant une capacité de rétention de l'humidité relativement plus faible que d'autres régions dudit corps absorbant (40) dans lesquelles ledit liquide est normalement stocké et

ledit article absorbant étant en outre caractérisé par un panneau perméable à la vapeur (70) qui est sensiblement imperméable aux liquides et est relié à ladite couche de feuille support (20) dans au moins une portion de ceinture dudit article, ledit panneau perméable à la vapeur (70) étant superposé à, et coïncidant avec, au moins une partie de ladite zone de transfert de l'humidité (44).

2. Article absorbant selon la revendication 1, dans lequel ladite zone de transfert de l'humidité (44) a un indice de rétention de l'humidité qui n'est pas supérieur à 40 grammes.

3. Article absorbant selon la revendication 1, dans lequel ledit panneau perméable à la vapeur est suffisamment imperméable aux liquides pour supporter une colonne d'eau de 70 cm pendant 5 secondes sans que les fuites visibles à travers celui-ci ne soient supérieures à 0,05 ml d'eau.

4. Article absorbant selon l'une des revendications précédentes, dans lequel ledit panneau perméable à la vapeur (70) est constitué d'un matériau ayant une valeur de taux de transmission de la vapeur d'eau (WVTR, d'après la nomenclature anglaise "Water Vapor Transmission Rate") d'au moins 2.000 g/m$^2$/24 heures, de préférence d'au moins 4.000 g/m$^2$/24 heures et mieux d'au moins 5.000 g/m$^2$/24 heures.

5. Article absorbant selon l'une des revendications précédentes, comprenant en outre une ou plusieurs couches de séparation (50,52,54) situées entre ladite couche de feuille supérieure (30) et ledit corps absorbant (40).

6. Article absorbant selon la revendication 5, dans lequel lesdites couches de séparation (50,52,54) et ladite couche de feuille supérieure (30) ont un bouffant combiné total (sous 0,207 kPa) d'au moins 0,078 cm, de préférence compris entre 0,1 et 0,6 cm.

7. Article absorbant (10) selon la revendication 1, comprenant :

   une ou plusieurs couches de séparation (50,52,54) situées entre ladite couche de feuille supérieure (30) et ledit corps absorbant (40), lesdites couches de séparation (50,52,54) permettant un transfert efficace de fluides entre ladite couche de feuille supérieure (30) et ledit corps absorbant (40) et formant des moyens d'espacement constitués d'un matériau sensiblement hydrophobe et ayant un bouffant total compris dans la gamme de 0,07 à 0,51 cm (sous 0,207 kPa) ; et

   dans lequel ledit panneau perméable à la vapeur (70) s'étend sur une surface comprise dans la gamme de 5 à 400 cm$^2$.

8. Article absorbant selon l'une des revendications précédentes, dans lequel ledit panneau perméable à la vapeur (70) est formé dans une portion de ceinture avant et/ou dans une portion de ceinture arrière de ladite couche de feuille support (20).

9. Article absorbant selon l'une des revendications précédentes, dans lequel ledit panneau perméable à la vapeur (70) comprend une nappe fibreuse non tissée calandrée obtenue par fusion-soufflage.

10. Article absorbant selon l'une des revendications précédentes, dans lequel ladite zone de transfert de l'humidité (44) comprend une masse de fibres hydrophobes, de préférence une masse de fibres de polyester.

11. Article absorbant selon l'une des revendications précédentes, dans lequel ladite zone de transfert de l'humidité (44) a un Indice de Rétention de l'Humidité qui n'est pas supérieur à 30 g et, de préférence, n'est pas supérieur à 20 g.

12. Article absorbant selon l'une des revendications précédentes, dans lequel ladite zone de transfert de l'humidité (44) a un Indice de Drainage qui n'est pas supérieur à 0,2 g, de préférence à 0,1 g et mieux

à 0,05 g.

**13.** Article absorbant selon l'une des revendications précédentes, dans lequel ladite zone de transfert de l'humidité (44) comprend un composite, de préférence un composite multicouches.

**14.** Article absorbant selon l'une des revendications précédentes, dans lequel ladite zone de transfert de l'humidité (44) comprend une nappe fibreuse ayant une masse spécifique comprise dans la gamme de 0,001 à 0,05 kg/cm$^3$ et un poids de base compris dans la gamme de 5 à 300 g/m$^2$.

**15.** Article absorbant selon l'une des revendications précédentes, dans lequel ledit panneau perméable à la vapeur (70) est construit en un matériau qui présente une valeur Humidité Relative Test (TRH, d'après la nomenclature anglaise "Test Relative Humidity") qui n'est pas supérieure à 80%, de préférence à 75%.

**16.** Article absorbant selon l'une des revendications précédentes, comprenant en outre des moyens d'espacement (50,52,54) situés entre ladite couche de feuille supérieure (30) et ledit corps absorbant (40), lesdits moyens d'espacement permettant un transfert efficace de fluides entre ladite couche de feuille supérieure et ledit corps absorbant, lesdits moyens d'espacement étant constitués d'un matériau sensiblement hydrophobe, et lesdits moyens d'espacement et ladite couche de feuille supérieure ayant un bouffant total d'au moins 0,078 cm.

**17.** Article absorbant selon la revendication 16, dans lequel lesdits moyens d'espacement comprennent une ou plusieurs couches de séparation (50,52,54) constituées d'un matériau fibreux ayant un bouffant combiné d'au moins 0,04 cm.

**18.** Article absorbant selon l'une des revendications 5 à 17, dans lequel une ou plusieurs desdites couches de séparation (50,52,54) est constituée d'une étoffe à mailles.

**19.** Article absorbant selon l'une des revendications précédentes, dans lequel ledit panneau perméable à la vapeur (70) s'étend sur une surface totale de perméabilité à la vapeur d'au moins 5 cm$^2$.

**20.** Article absorbant selon l'une des revendications précédentes, dans lequel ledit matériau de panneau perméable à la vapeur (70) s'étend sur 10 à 40% de la longueur dudit corps absorbant.

**21.** Article absorbant selon l'une des revendications précédentes, dans lequel ledit corps absorbant (40) comprend une zone de transfert de l'humidité (44) qui a un poids de base composite qui n'est pas supérieur à 550 g/m$^2$, située en relation de vis-à-vis et au voisinage dudit panneau perméable à la vapeur (70).

**22.** Article absorbant selon l'une des revendications précédentes, dans lequel ladite zone de transfert de l'humidité (44) du corps absorbant (40) a une masse spécifique qui n'est pas supérieure à 0,1 g/cm$^3$.

**23.** Article absorbant selon l'une des revendications précédentes, dans lequel la zone de transfert de l'humidité (44) située en relation de fonctionnement avec ledit panneau perméable à la vapeur (70) a un poids de base moyen compris dans la gamme de 5 à 300 g/m$^2$ et/ou une masse spécifique moyenne comprise dans la gamme de 0,001 à 0,05 g/cm$^3$ et/ou un bouffant d'au moins 0,51 cm (environ 0,02 pouce).

**24.** Article absorbant (10) selon la revendication 1, comprenant :

une ou plusieurs couches de séparation perméable(s) aux liquides (50,52,54) située(s) entre ladite couche de feuille supérieure (30) et ledit corps absorbant (40), lesdites couches de séparation (50,52,54) permettant le transfert de fluides entre ladite couche de feuille supérieure (30) et ledit corps absorbant (40), lesdites couches de séparation (50,52,54) étant constituées d'un matériau sensiblement hydrophobe, et lesdites couches de séparation et ladite couche de feuille supérieure ayant un bouffant total d'au moins 0,078 cm (sous 0,207 kPa).

**25.** Article absorbant selon la revendication 24, dans lequel ledit panneau perméable à la vapeur (70) est constitué d'un matériau ayant une valeur de taux de transmission de la vapeur d'eau (WVTR) d'au moins 2.000 g/m$^2$/24 heures, de préférence d'au moins 4.000 g/m$^2$/24 heures et mieux, d'au moins 5.000 g/m$^2$/24 heures.

**26.** Article absorbant selon la revendication 24 ou 25, dans lequel lesdites couches de séparation (50,52,54) ont un bouffant combine total d'au moins 0,04 cm (sous 0,207 kPa).

**27.** Article absorbant selon l'une des revendications 24 à 26, dans lequel lesdites couches de séparation (50,52,54) et ladite couche de feuille supérieure ont un bouffant combiné total d'au moins 0,078 cm (sous 0,207 kPa) ou, de préférence, compris dans la gamme de 0,1 à 0,6 cm.

**28.** Article absorbant selon l'une des revendications 24 à 27, dans lequel ledit panneau perméable à la vapeur (70) s'étend sur une surface totale de perméabilité à la vapeur d'au moins 5 cm$^2$.

**29.** Article absorbant selon l'une des revendications 24 à 28, dans lequel ledit panneau perméable à la vapeur (70) est formé dans une portion de ceinture avant (12) et/ou dans une portion de ceinture arrière (14) de ladite couche de feuille support.

**30.** Article absorbant selon l'une des revendications 24 à 29, dans lequel ledit panneau perméable à la vapeur (70) est constitué d'une nappe fibreuse non tissée calandrée obtenue par fusion-soufflage.

**31.** Article absorbant selon l'une des revendications 24 à 30, dans lequel lesdites couches de séparation (50,52,54) comprennent une à cinq couches de matériau en nappe fibreuse non tissée.

**32.** Article absorbant selon la revendication 31, dans lequel lesdites couches de séparation (50,52,54) sont des couches de matériau en nappe fibreuse liée au filage, constituées de fibres de polyoléfine.

**33.** Article absorbant selon la revendication 32, dans lequel chacune des nappes fibreuses liées au filage a un poids de base total d'au moins 34 g/m$^2$.

**34.** Article absorbant selon la revendication 32, dans lequel une ou plusieurs desdites couches de nappes fibreuses liées au filage est (sont) constituée(s) de fibres de polypropylène et a (ont) un poids de base compris dans la gamme de 55 à 170 g/m$^2$ et une masse spécifique apparente comprise entre 0,03 et 0,5 g/cm$^3$ (sous 0,207 kPa).

**35.** Article absorbant selon la revendication 34, dans lequel lesdites fibres de polypropylène ont un titre compris dans la gamme de 0,17 à 0,67 tex (1,5 à 6 deniers).

**36.** Article absorbant selon l'une des revendications 24 à 35, dans lequel ledit corps absorbant (40) présente une pluralités de perforations (43) au travers de son épaisseur et dans lequel au moins une partie desdites perforations coïncide en fonctionnement avec le panneau perméable (70).

**37.** Article absorbant selon l'une des revendications 24 à 36, dans lequel ledit corps absorbant (40) a une zone de transfert de l'humidité (44) qui coïncide en fonctionnement avec ledit panneau perméable à la vapeur (70), ladite zone de transfert de l'humidité (44) ayant une masse spécifique comprise dans la gamme de 0,001 à 0,05 g/cm$^3$ et un poids de base compris dans la gamme de 5 à 300 g/m$^2$.

**38.** Article absorbant selon l'une des revendications 24 à 37, dans lequel ledit panneau perméable à la vapeur (70) est construit en un matériau qui présente une valeur d'Humidité Relative Test (TRH) qui n'est pas supérieure à 80%, de préférence a 75%.

**39.** Article absorbant selon l'une des revendications 24 à 38, dans lequel lesdites couches de séparation (50,52,54) sont limitées aux deux-tiers de la portion avant dudit article absorbant (10).

**40.** Article absorbant selon l'une des revendications 24 à 38, dans lequel lesdites couches de séparation (50,52,54) sont limitées à 35-60% de la portion centrale dudit article absorbant.

**41.** Article absorbant selon l'une des revendications 24 à 40, dans lequel ledit article comprend une pluralité de couches de séparation individuelles (50,52,54), dont deux ou plus sont connectées ensemble en des emplacements espacés choisis (46).

**42.** Article absorbant selon la revendication 41, dans lequel lesdites couches de séparation (50,52,54) sont connectées les unes aux autres en de petits emplacements disposés suivant un motif choisi.

**43.** Article absorbant (10) selon la revendication 1, comprenant :
des moyens d'espacement (50,52,54) situés entre ladite couche de feuille supérieure et ledit corps absorbant (40), lesdits moyens d'espacement permettant un transfert efficace de fluides entre ladite couche de feuille supérieure et ledit corps absorbant, lesdits moyens d'espacement étant constitués d'un matériau sensiblement hydrophobe et ayant un bouffant total d'au moins 0,04 cm.

**44.** Article absorbant selon la revendication 43, dans lequel ledit panneau perméable à la vapeur (70) est constitué d'un matériau qui présente un taux de transmission de la vapeur d'eau (WVTR) d'au moins 2.000 g/m$^2$/24 heures et/ou qui s'étend sur une surface comprise dans la gamme de 5 à 400 cm$^2$.

**45.** Article absorbant selon la revendication 43 ou 44, dans lequel ledit matériau de panneau perméable à la vapeur (70) s'étend sur 10 à 40% de la longueur dudit corps absorbant à partir d'un bord terminal de ceinture avant dudit corps absorbant (40).

**46.** Article absorbant selon l'une des revendications 43 à 45, dans lequel ledit corps absorbant (40) a une zone de transfert de l'humidité (44) qui est située en relation de vis-à-vis et au voisinage dudit panneau perméable à la vapeur (70) et a un poids de base qui n'est pas supérieur à 550 g/m$^2$ et/ou une masse spécifique qui n'est pas supérieure à 0,1 g/cm$^3$.

**47.** Article absorbant (10) selon la revendication 1, comprenant :
un panneau perméable à la vapeur (70) connecté à ladite couche de feuille support (20) dans au moins une portion de ceinture (12,14) dudit article, ledit panneau perméable à la vapeur (70) étant constitué d'un matériau qui est sensiblement imperméable aux liquides, qui présente un taux de transmission de la vapeur d'eau (WVTR) d'au moins 2.000 g/m$^2$/24 heures et qui s'étend sur une surface d'au moins 22 cm$^2$,
et un corps absorbant (40) situé entre ladite couche de feuille support (20) et ladite couche de feuille supérieure (30) et disposé dans une partie dudit corps absorbant (40) en relation de superposition, et de façon à coïncider, avec ledit panneau perméable à la vapeur (70).

**48.** Article absorbant selon la revendication 47, dans lequel ledit panneau perméable à la vapeur s'étend sur une surface d'au moins 45 cm$^2$.

**49.** Article absorbant selon la revendication 47 ou 48, dans lequel ledit corps absorbant (40) comprend une zone de transfert de l'humidité (44), laquelle zone coïncide en fonctionnement avec ledit panneau perméable à la vapeur (70) et a un poids de base moyen compris dans la gamme de 5 à 300 g/m$^2$.

**50.** Article absorbant selon l'une des revendications 47 à 49, dans lequel ladite zone de transfert de l'humidité (44) a une masse spécifique moyenne comprise dans la gamme de 0,001 à 0,05 g/cm$^3$.

**51.** Article absorbant (10) selon la revendication 1, comprenant :
un panneau perméable à la vapeur (70) qui est sensiblement imperméable aux liquides et est relié à ladite couche de feuille support (20) dans au moins une portion de ceinture (12,14) dudit article, ledit panneau perméable à la vapeur (70) étant constitué d'un matériau présentant un taux de transmission de la vapeur d'eau (WVTR) d'au moins 2.000 g/m$^2$/24 heures et s'étendant sur une surface d'au moins 22 cm$^2$ environ ; et
un corps absorbant (40) situé entre ladite couche de feuille support (20) et ladite couche de feuille supérieure (30) et ayant une zone de transfert de l'humidité (44) qui, en fonctionnement, est située en relation de vis-à-vis avec, et coïncide avec, ledit panneau perméable à la vapeur, ladite zone de transfert de l'humidité étant pourvue d'une ou plusieurs perforations (43) formées à travers celle-ci pour lui conférer une valeur de porosité Frazier dans l'air d'au moins 15,25 m$^3$/mn/m$^2$.

**52.** Article absorbant selon la revendication 51, dans lequel ladite zone de transfert de l'humidité perforée (44) fournit une valeur de porosité Frazier dans l'air comprise dans la gamme de 15,25 à 30 m$^3$/mn/m$^2$.

53. Article absorbant selon la revendication 51 ou 52, dans lequel lesdites perforations (43) sont sensiblement circulaires et ont un diamètre moyen compris dans la gamme de 0,5 à 2,0 cm.

54. Article absorbant selon l'une quelconque des revendications précédentes, dans lequel ladite zone de transfert de l'humidité (44) est constituée d'un matériau fibreux non mouillable sensiblement hydrophobe qui a un poids de base compris dans la gamme d'environ 5 à 300 g/m$^2$ et une masse spécifique qui n'est pas supérieure à environ 0,1 g/cm$^3$, ledit matériau fibreux non mouillable étant configuré pour limiter son effet de drainage et la présence dans celui-ci d'un liquide et pour limiter l'obstruction dudit matériau fibreux non mouillable par le liquide.

55. Article absorbant selon l'une quelconque des revendications précédentes, dans lequel ladite zone de transfert de l'humidité (44) comprend un matériau fibreux non mouillable sensiblement hydrophobe ayant un poids de base compris dans la gamme de 5 à 300 g/m$^2$ et situé dans une ou plusieurs perforations qui sont entièrement espacées de bords de ceinture opposés longitudinalement dudit corps absorbant (40) et qui sont ménagées à travers l'épaisseur dudit corps absorbant (40), ledit matériau fibreux non mouillable étant configuré pour limiter son effet de drainage et la présence dans celui-ci d'un liquide et pour limiter l'obstruction dudit matériau fibreux non mouillable par le liquide.

56. Article absorbant selon l'une quelconque des revendications précédentes, dans lequel ladite zone de transfert de l'humidité (44) est constituée d'un matériau fibreux non mouillable sensiblement hydrophobe qui a un poids de base compris dans la gamme de 5 à 300 g/m$^2$ et est configurée pour s'étendre d'un côté à l'autre d'un bord entier de ceinture dudit corps absorbant (40), ledit matériau fibreux non mouillable étant configuré pour limiter son effet de drainage et la présence dans celui-ci d'un liquide et pour limiter l'obstruction dudit matériau fibreux non mouillable par le liquide.

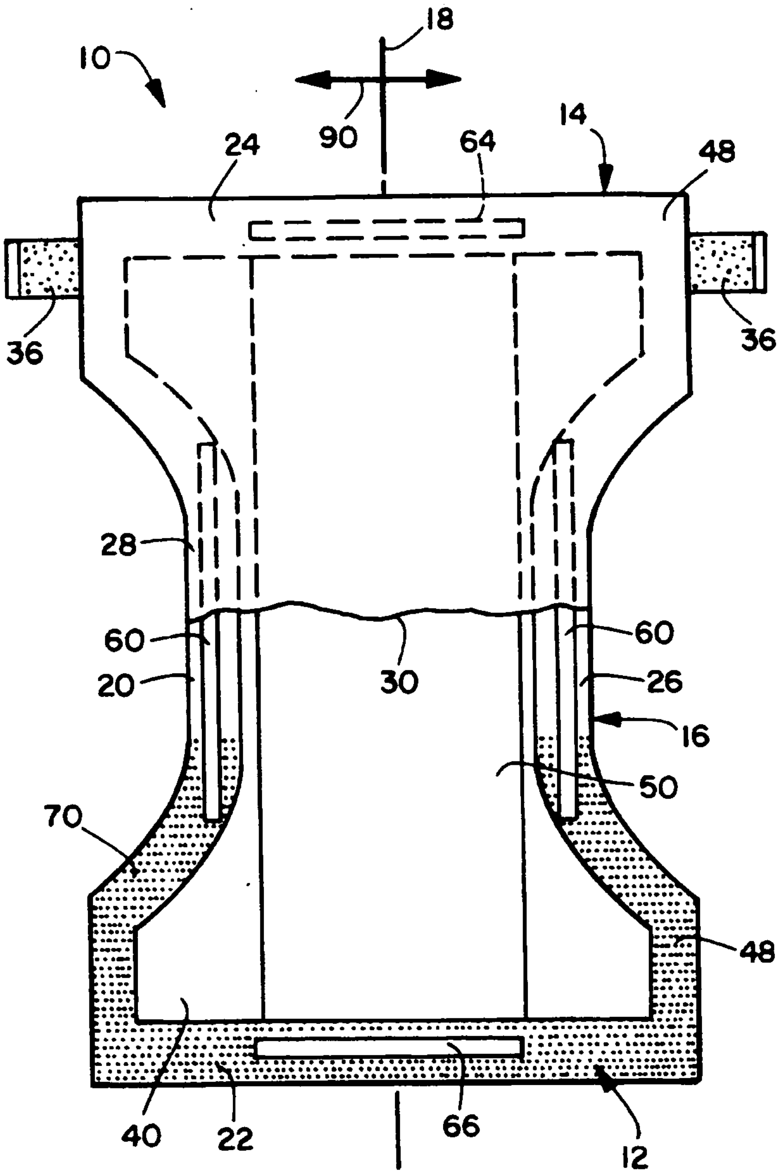

FIG. 1

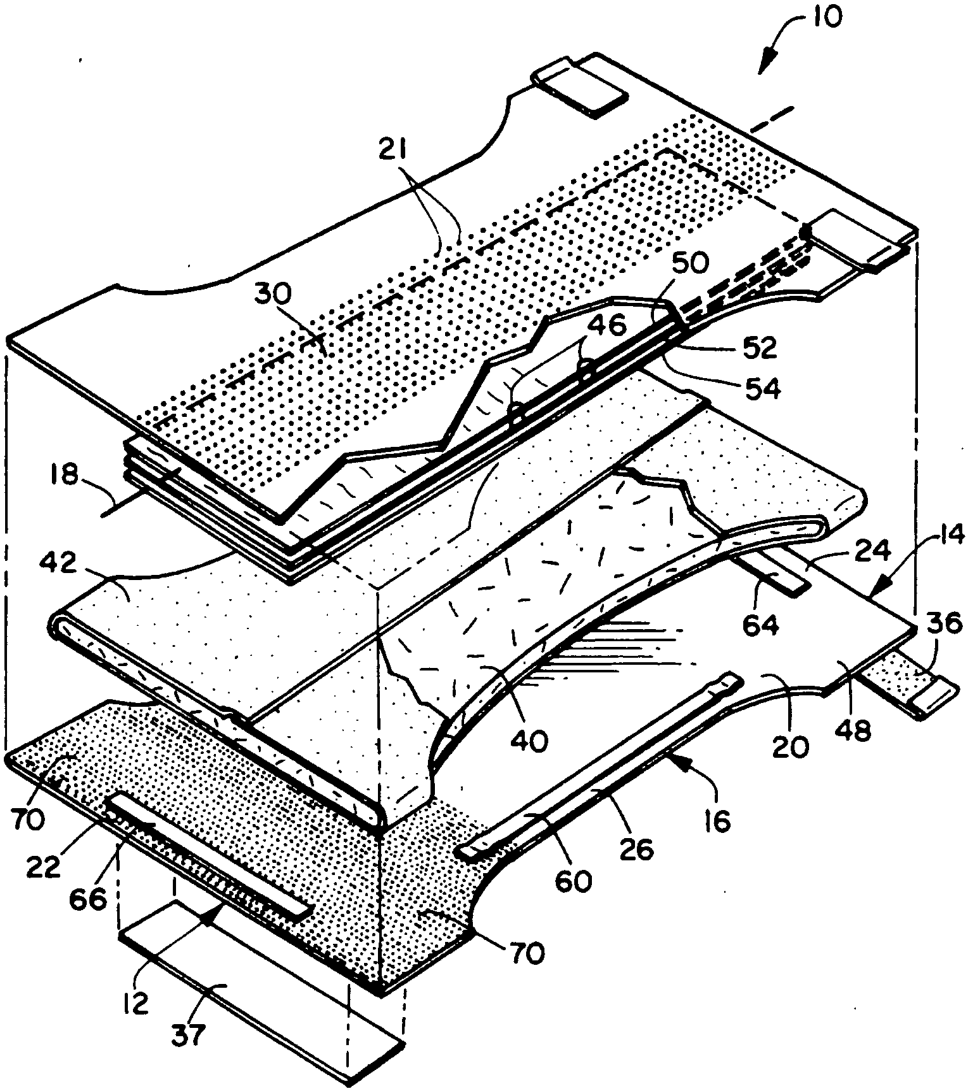

FIG. 2

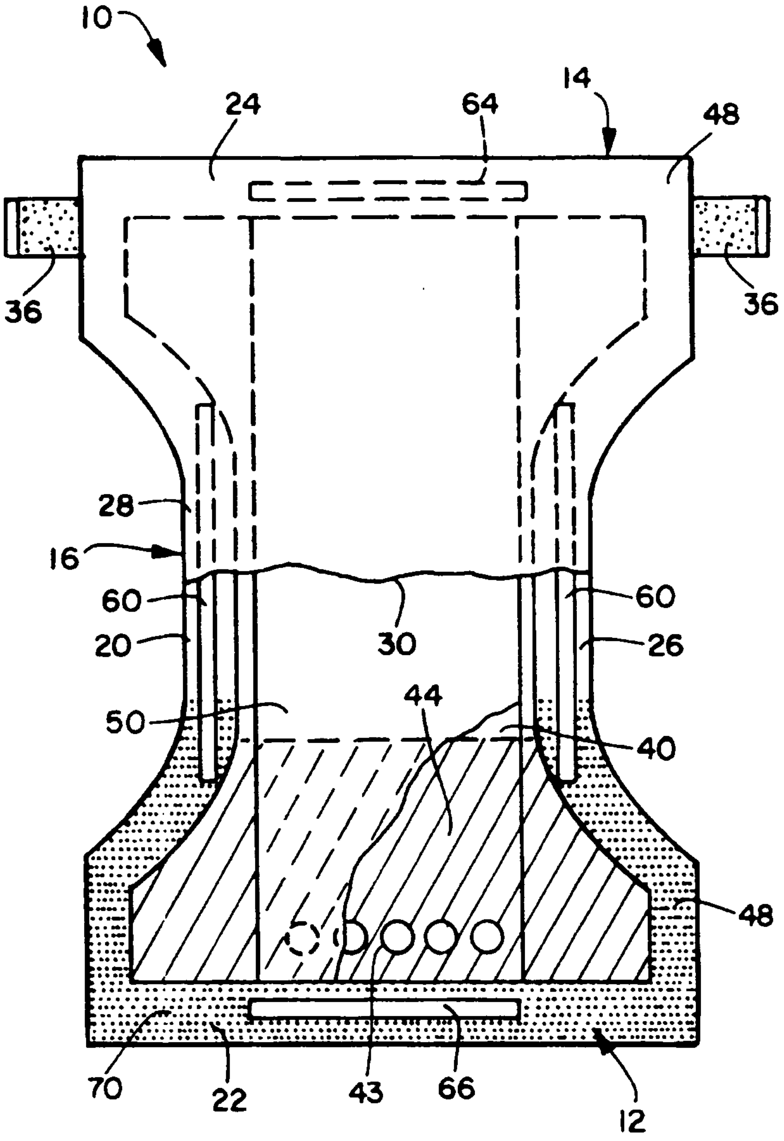

FIG. 3

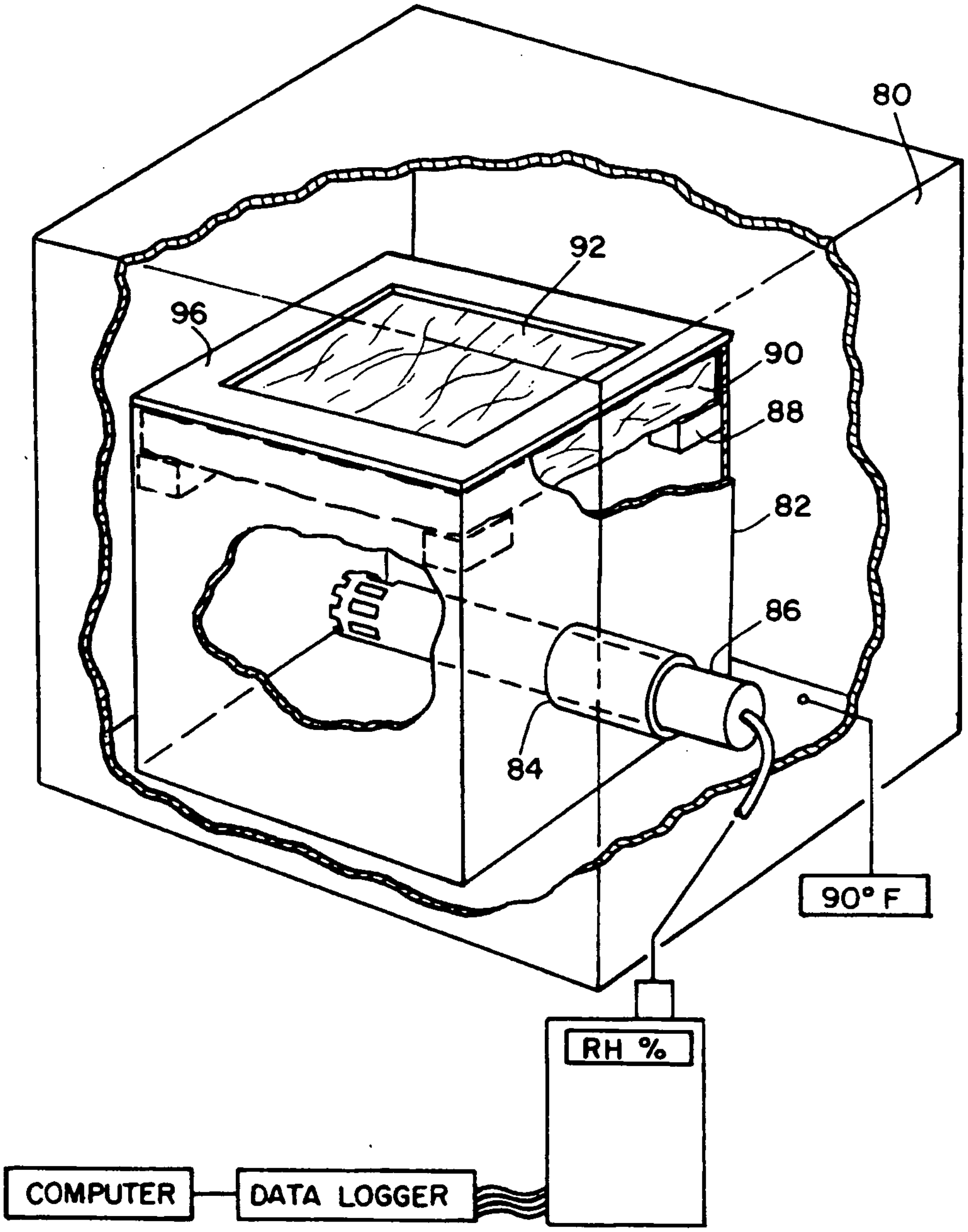

FIG. 4

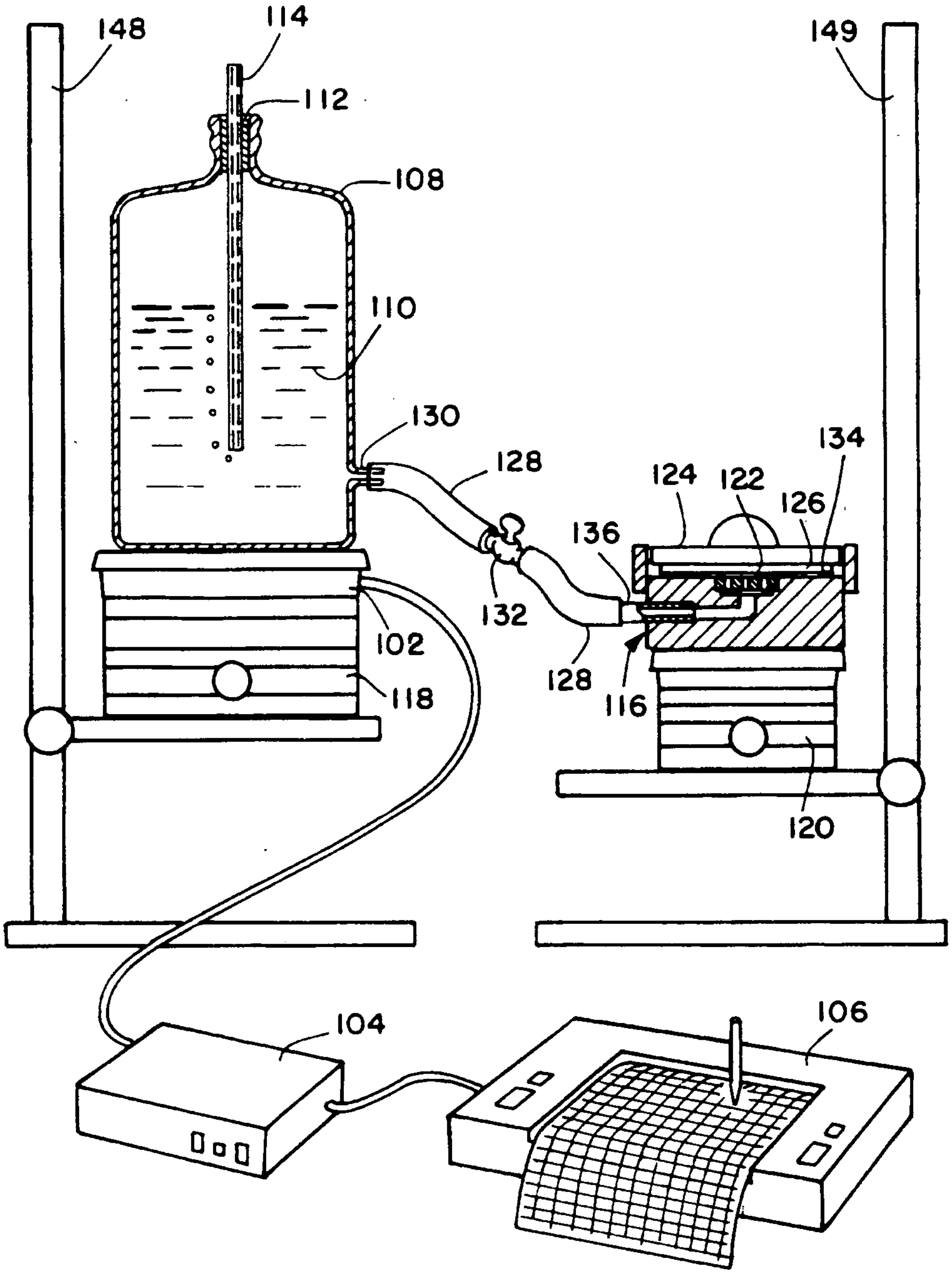

FIG. 5

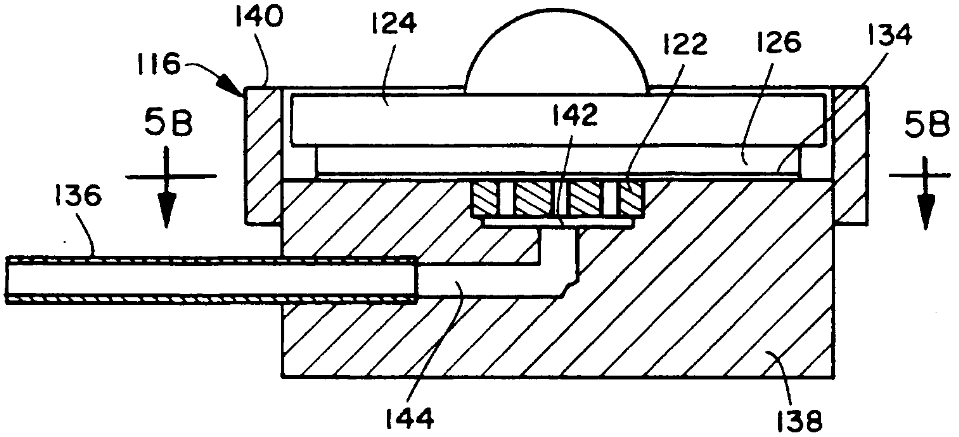
5B
5B

FIG. 5A

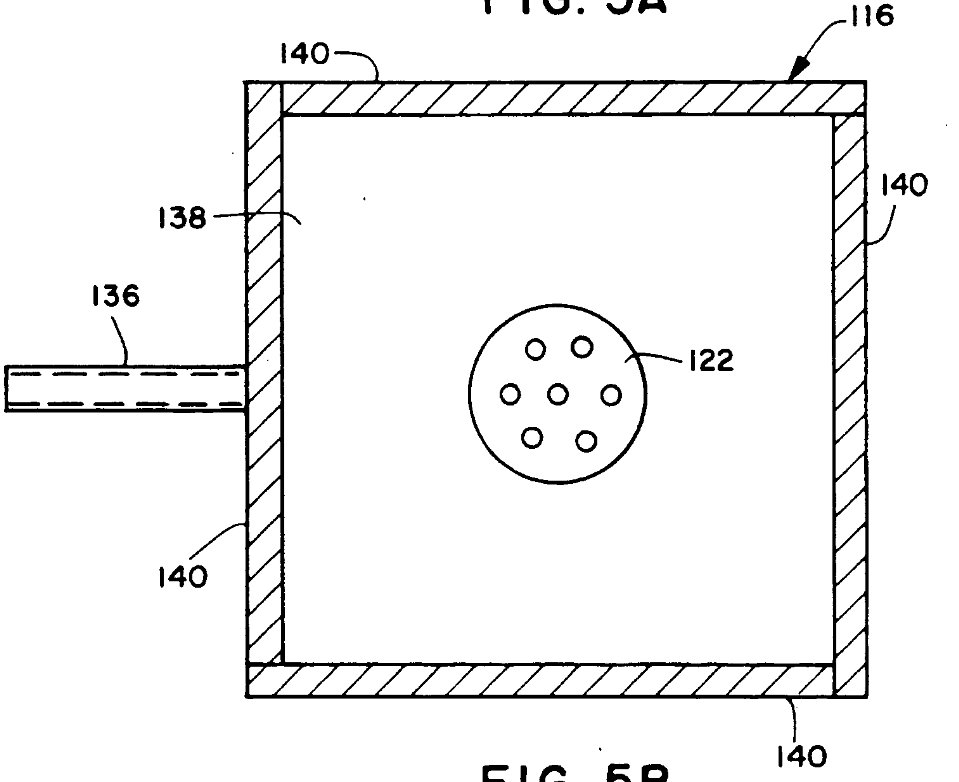

FIG. 5B

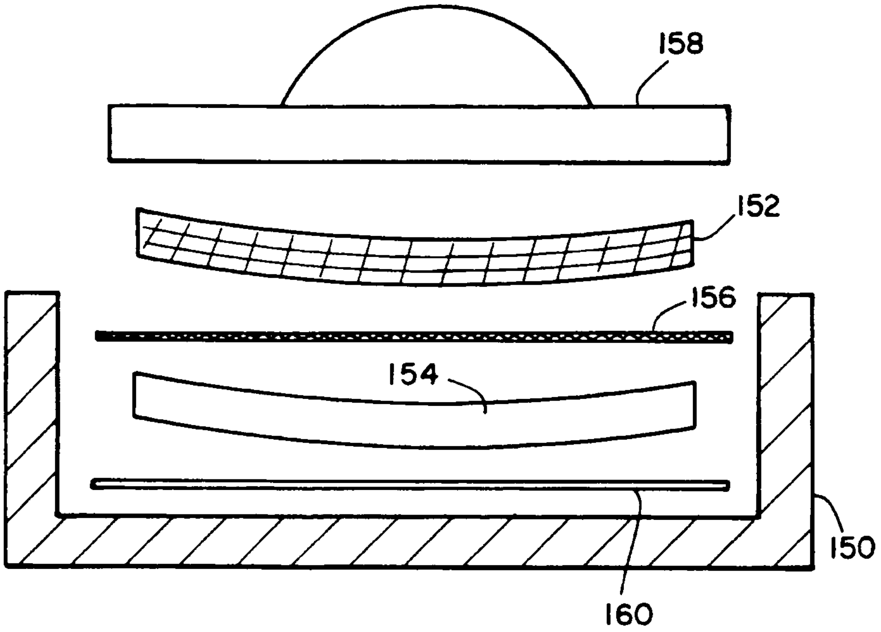

FIG. 6

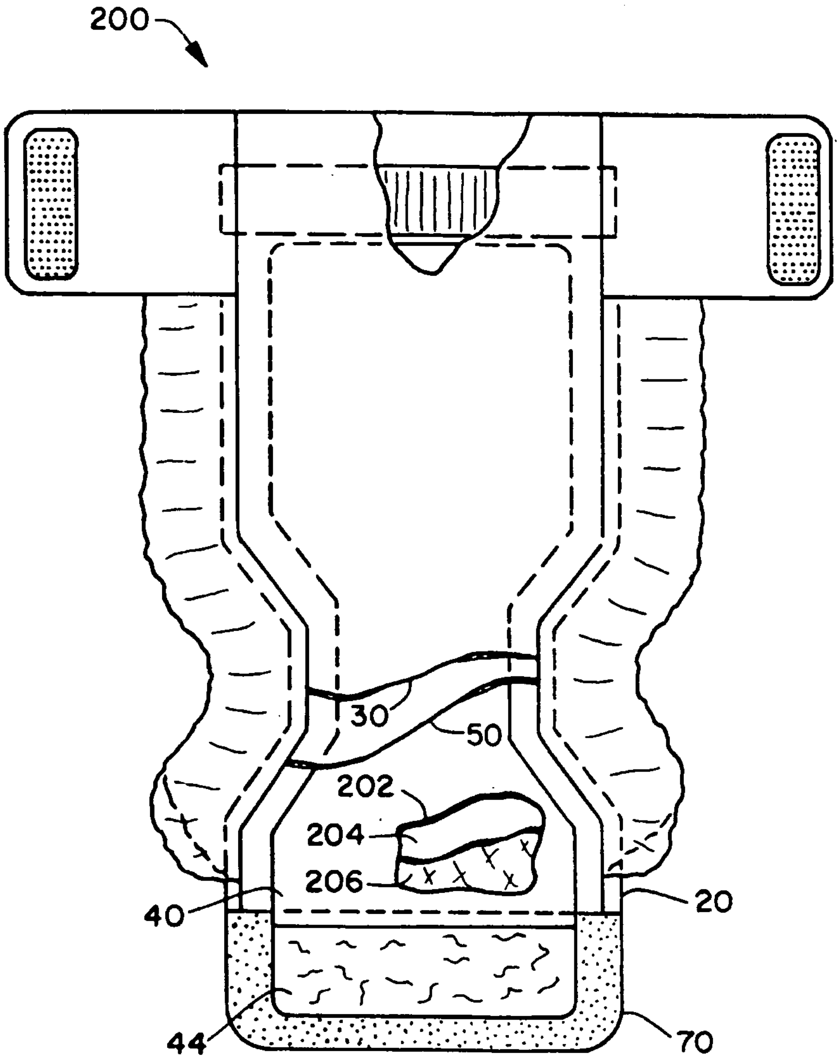

FIG. 7

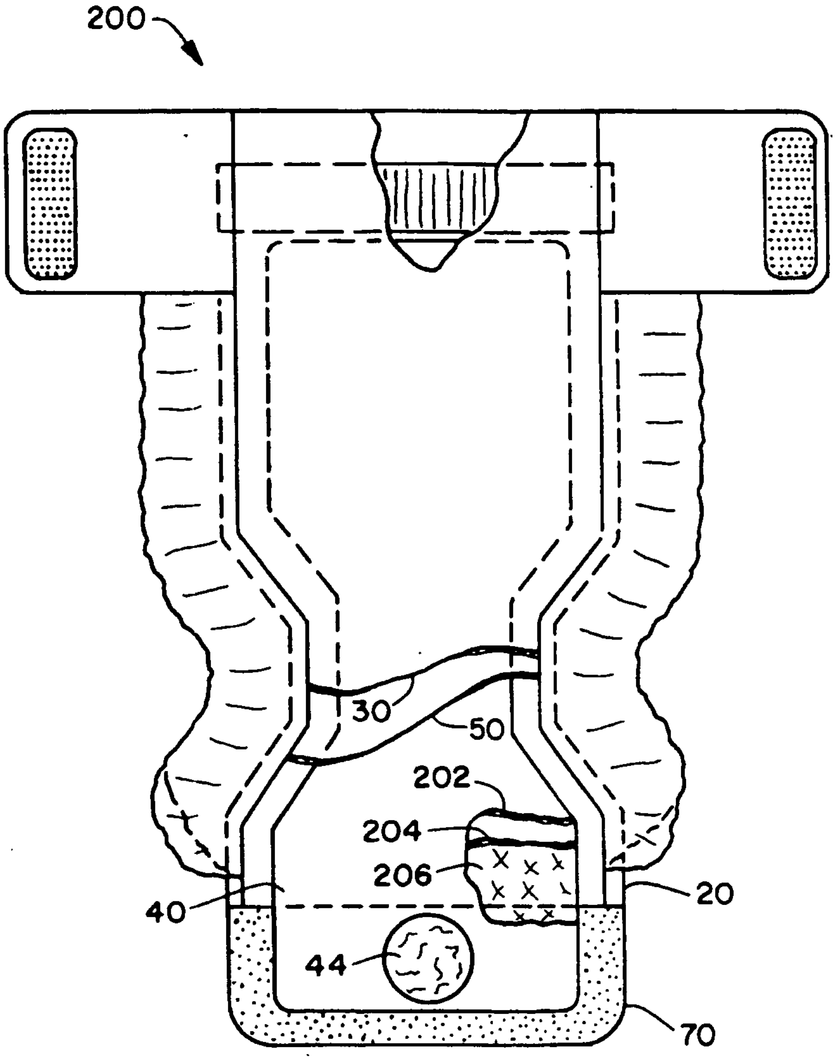

FIG. 8

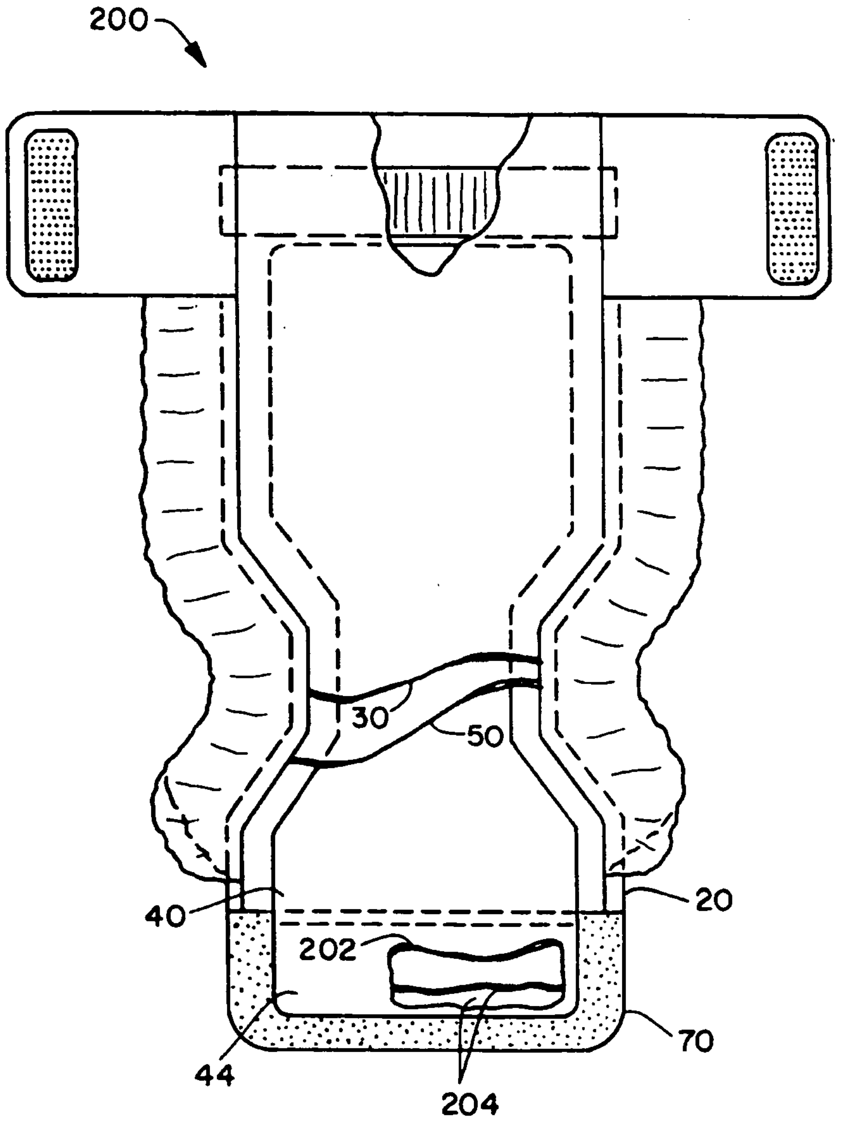

FIG. 9

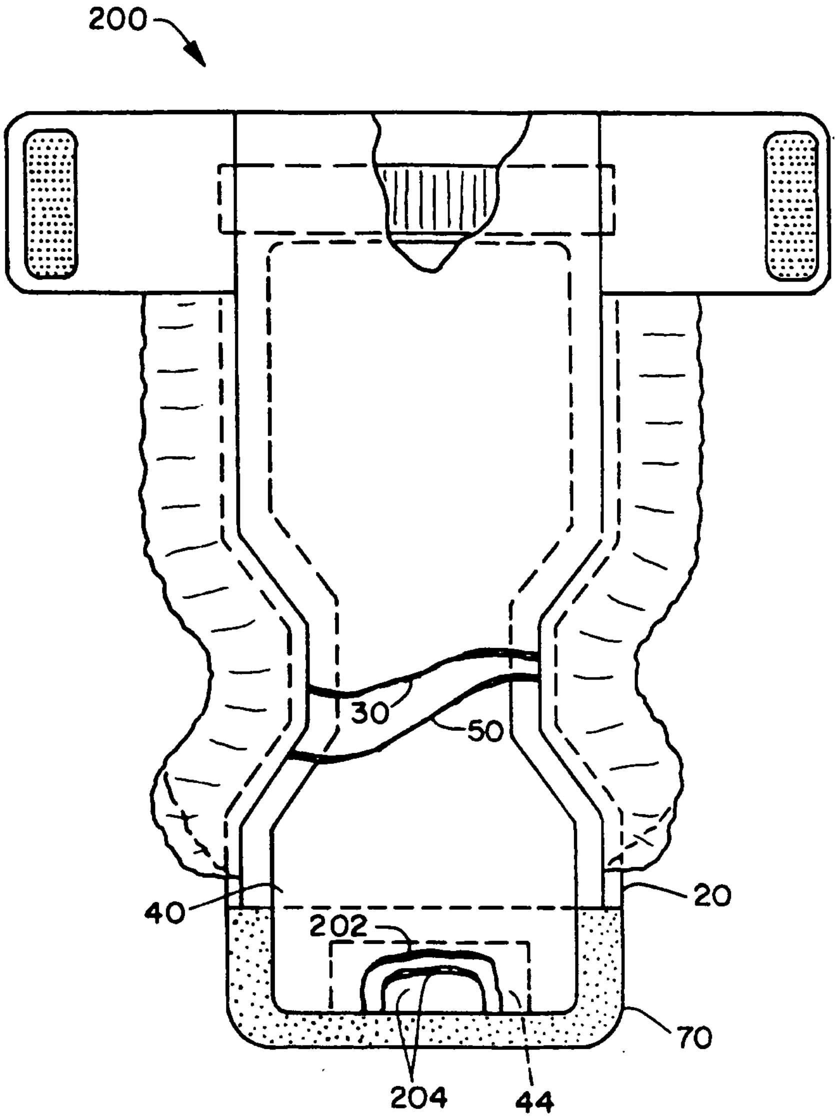

FIG. 10

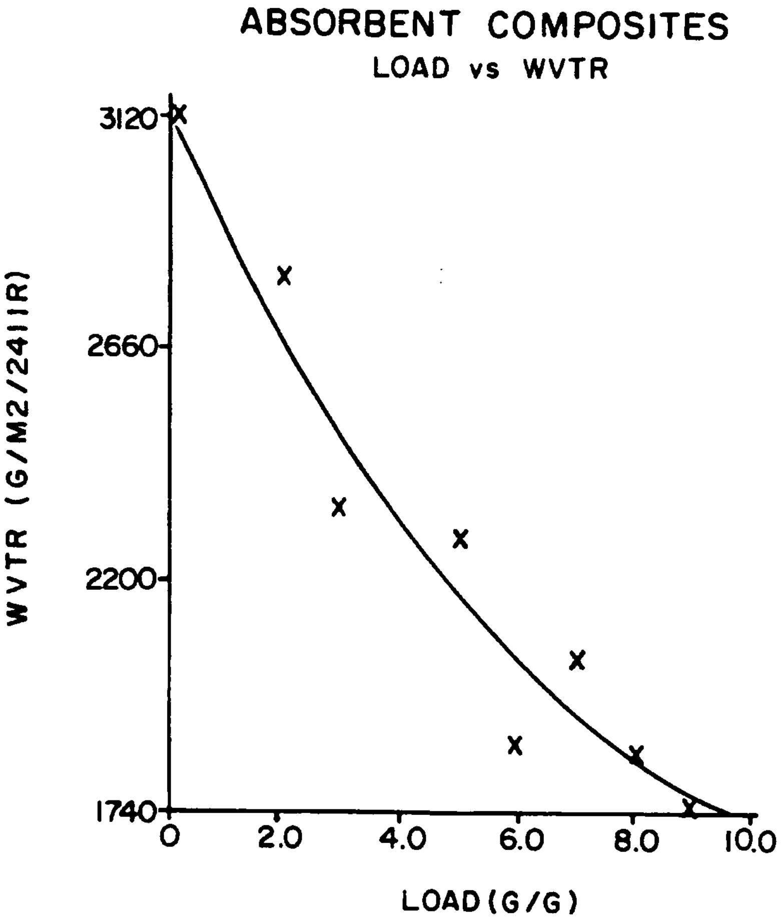
ABSORBENT COMPOSITES
LOAD vs WVTR
3120
2660
2200
1740
WVTR (G/M2/24 HR)
0
2.0
4.0
6.0
8.0
10.0
LOAD (G/G)

FIG. 11